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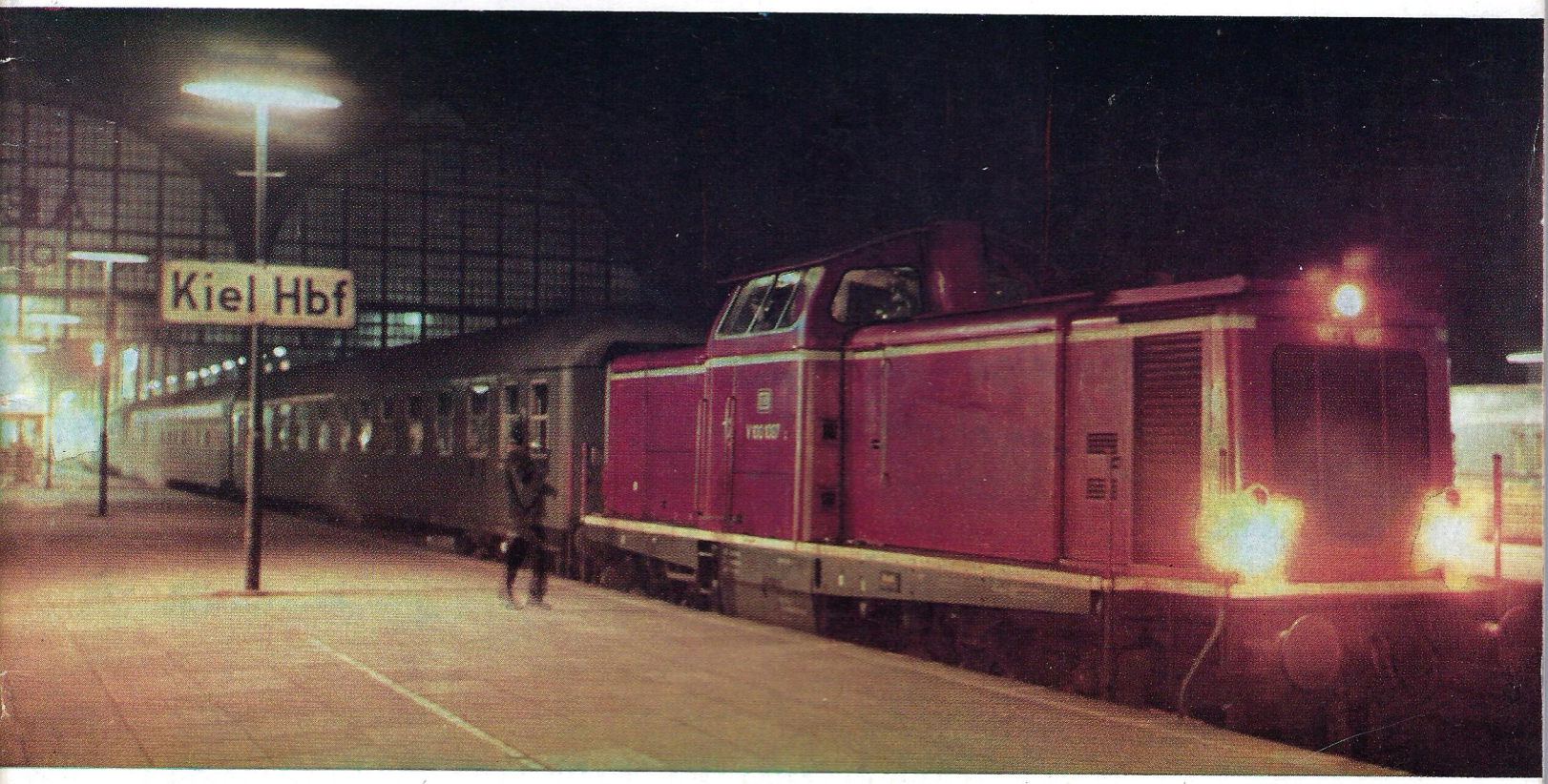

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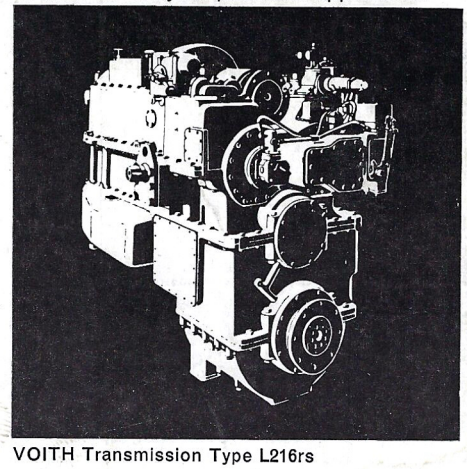

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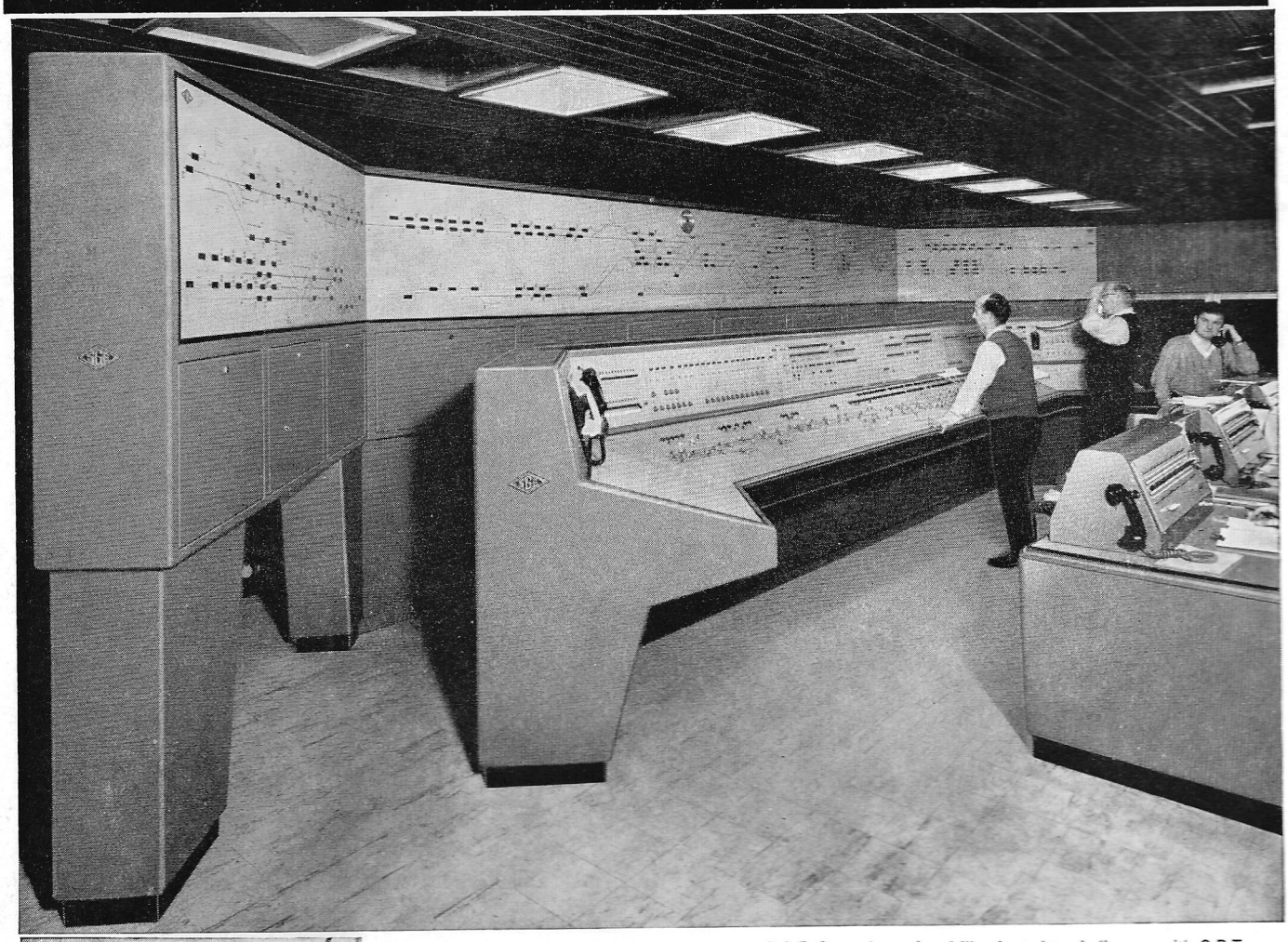

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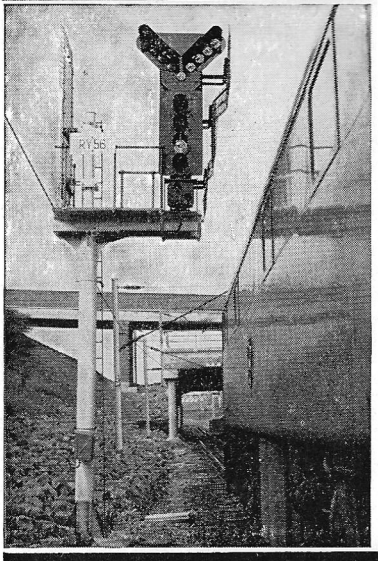

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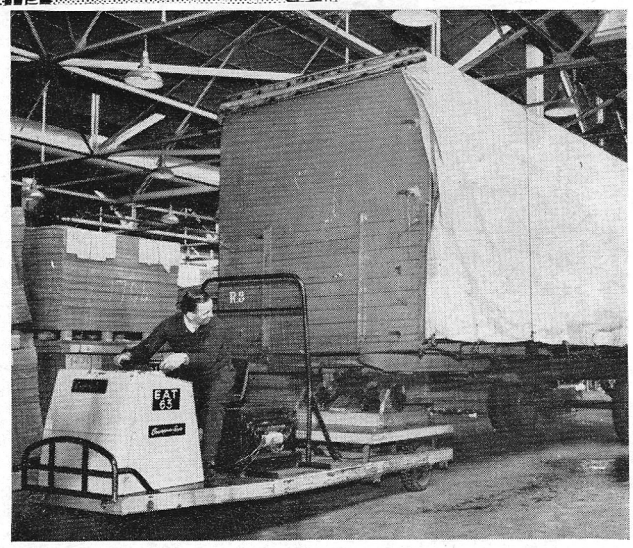

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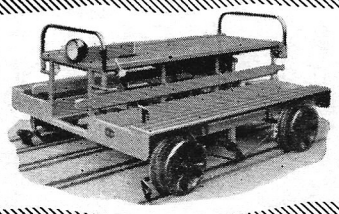

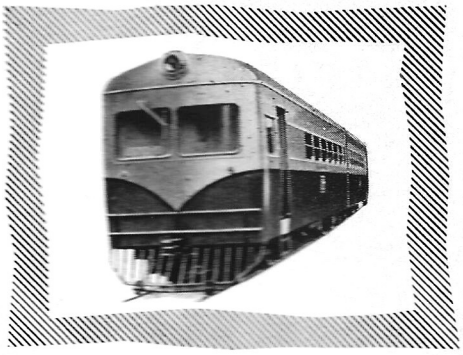

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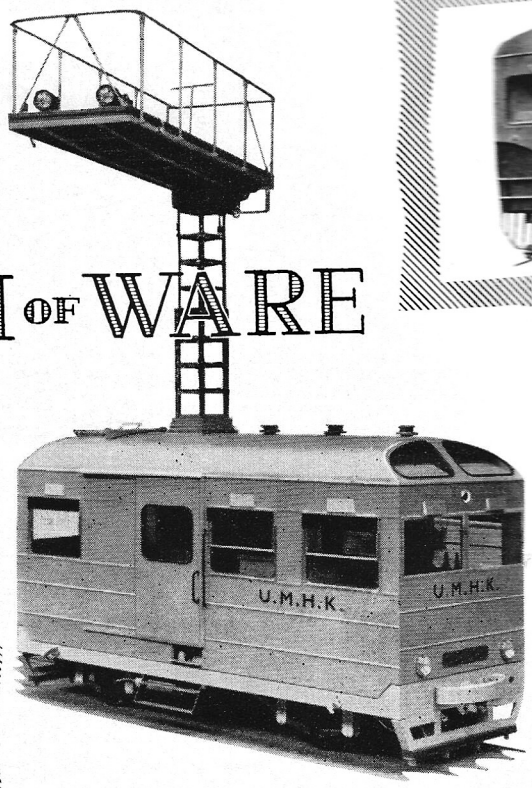
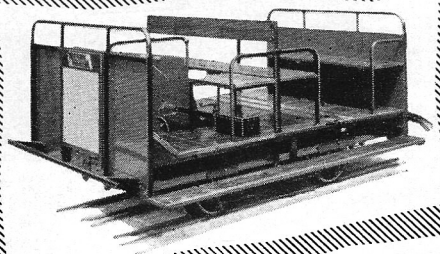
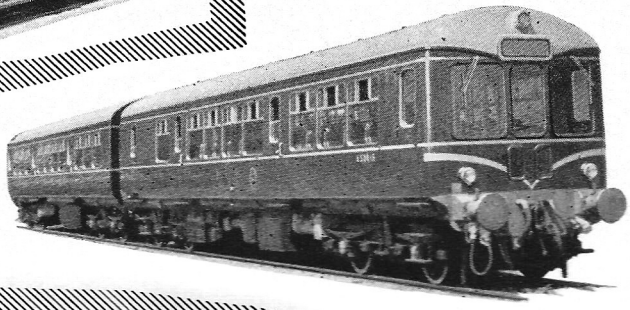
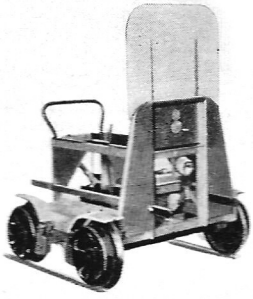
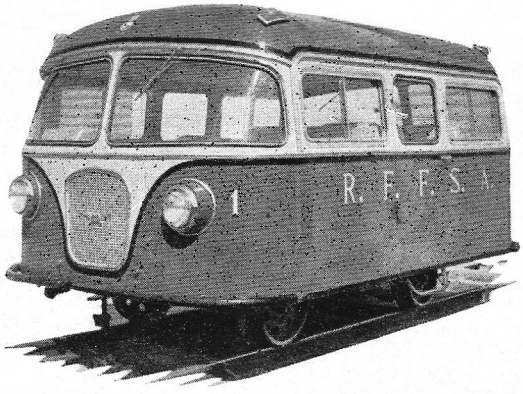


Overhead line inspection vehicle built for Union Miniere du Haut Katanga









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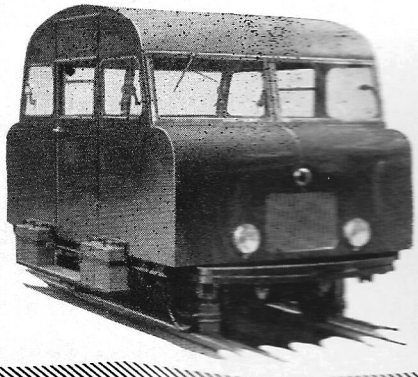

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Incorporating THE LOCOMOTIVE RAILWAY CARRIAGE & WAGON REVIEW

Vol. XXI No. 199 APRIL 1965

CONTENTS

Beeching part two: BR and a 4,000 h.p. diesel: one engine or two? 181
Letters 184
Railways' cross-Channel car business is booming 186
Bristol–Birmingham freight dieselisation scheme launched 187
Beeching part two
The trunk line plan for 1984 188
Sir John Elliot: A great opportunity—but will it be wasted? 197
Lord Hinton and the new Transport Advisory Council 198
From stationmasters to station managers on BR 199
The German Federal's traction plan: the first 10 years—Part 1 200
BR must pursue a continuous traction development policy 208
Paddington–Worcester speed-up 209
English Electric and British Railways 210
The German Federal's new 125 m.p.h. 8,000 h.p. electric 214
BR now run 60 Ford trains a week 216
Scotland will operate BR's first merry-go-round in 1966 217
Push-pull operation will cut SR's peak working costs 218
The LMR's Manchester Division increases tonnage by 10 per cent 219
Train running and traction performance 220
Accident report 224
What future for computers in railway signalling? 228
Today and tomorrow 230
Beyond the Channel 235
The Irish scene 236
Traffic report 237
New books 240

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Beeching part two

THE logic of Beeching Part Two, though for the most part as soberly convincing as the premises of the first Re-Shaping Report, is just as harsh; and at first glance the long-term implications for a number of lines look just as grim as the threats to countless secondary services in the appendices of the 1963 document. Yet so far public reaction has been unconscionably mild.

Partly this is due to the less imperative, more suppliant attitude struck in the presentation of Part Two, which Dr. Beeching also brought to his publication-day press conference. But it might well have been otherwise. The first draft of Part Two was reportedly a great deal more uncompromising and specific of action—so much so that it shocked the Regions, who urged that another blunt document like the Re-Shaping Report (or one as bluntly sponsored) would damage customer relations and staff morale for just as long as the first. This may have helped persuade the BRB to adopt the wiser course of letting the statistics stand by their own cogency and of submitting the Report merely as a basis for national discussion. More heat has been taken out of any adverse public reaction by the Transport Minister's prompt emphasis that the BRB will have to seek Government approval before it embarks on any serious down-grading of non-selected lines and concentration of investment on the chosen routes; and also, of course, by the appointment of Lord Hinton to ensure that any drastic rationalisation of trunk routes will be controlled to suit wider national planning.

The Report has also disarmed criticism by its stress, which Dr. Beeching reinforced at his press conference, that the non-selected lines are not certain candidates for closure, nor even for starvation of further investment. Anyone who needs further assurance on this point should remember that one trunk route rationalisation—from London to the South-West—has already begun, but that the non-selected Waterloo–Exeter route is still functioning, even though its expresses were not covering their direct costs west of Salisbury before the dieselisation and timetable revision of last autumn. How much this winter's changes have done to rectify the economics of the Salisbury–Exeter service is not known. But there are indications that, if route and operating costs need to be cut further, this is feasible and may be done, even at the price of modest new investment. With all through freight switched to the ex-GWR route, a passably attractive passenger service could still be run on a route singled throughout, except for perhaps 10 miles in the Axminster area, and cheaply controlled with minimal signalling on the pattern foreshadowed for secondary routes in Brig. Langley's paper which we summarised last month. Further timetable revision would obviously be necessary as well.

Allied to cuts in station staff, a simplification of this thoroughness might make a viable passenger service of reasonable frequency practicable. That holds good for several non-selected routes, such

English Electric Type 4 diesel No. D362 with a mid-morning Aberdeen–Edinburgh express crosses the Tay Bridge in September 1964. The Tay Bridge is now undergoing its first major overhaul (*see page* 234).

Photo by W. J. V. Anderson

as Newcastle–Edinburgh and Birmingham–Paddington. One wishes that the Report had been more comfortingly specific on the possibilities in this respect for individual routes, instead of embracing them all in a general, qualified assurance. It is a pity, too, that as in the original Re-Shaping Report, some important towns and cities have had their existing passenger service to London implicitly threatened, but are not told clearly how they will be catered for in future, whether they will have trains as fast and frequent as at present, and whether, if they have to take a more circuitous route, they will be made to pay more for travel to and from London.

Conspicuously faced with uncertainty are, for example, Taunton, Leicester and Nottingham. Tauntonians in particular must be puzzled by the apparent chance that at some future date they may have to travel to London via Bristol; it is only a year since they were told that a good service for their town was one of the reasons why the ex-GWR Berks & Hants main line must be retained. But then the Report backtracks on previous thought in a number of places. Nothing was more eyebrow-raising than to be told by Dr. Beeching at his press conference that even concentration of some Midland and GE Line traffic on to the GN Line into London would not, so far as could be seen, complete a sure case for its electrification. So much for the economics of one of the major projects of the 1955 Plan.

So much, too, for the economics of a great deal of French and German electrification. And in a particularly controversial section, where the bases of its assessments of potential route capacity are described, the contrast between Continental attitudes and that of BR is no less marked. At a time when MODERN RAILWAYS is reporting almost monthly some fresh step in sure French, German and Italian progress to 70 m.p.h.-plus standards on principal trunk routes in this decade, the BRB sets the overall average speed of its expresses *twenty years from now* no higher than 70 m.p.h. This is a dismally conservative outlook. But it is understandable in view of the remarkably optimistic maximum capacity of up to 200 trains each way daily that the Report envisages for a double-track trunk route, even allowing for every benefit of modern traction, track, signalling and operating methods. It is very long odds indeed that 70 m.p.h. will be good enough to fill a day-long interval express service with passengers by 1984. If really competitive freight rates are incapable of achievement without such intensive concentration of goods traffic (but is it really practicable at the level proposed?), we had better acknowledge that an attractive express passenger service at present frequencies will become increasingly impossible and for the long term turn, like the French, to "flighting" truly fast trains in morning, midday and evening groups outside freight operating hours. The BRB should take note that, even at its modest initial speeds, Japan's New Tokaido line has lopped 8 per cent off Nippon Airways passenger carryings between Tokyo and Osaka.

BR and a 4,000 h.p. diesel

WITH RENFE reportedly window-shopping for 30 new 4,000 h.p. diesel locomotives, SNCF interest in this power-range warming (*see last month*) and future markets for such units plain to see, particularly in China and the Americas (Brazil has just ordered four metre-gauge 4,000 h.p. diesel-hydraulics from Krauss-Maffei, the German builders), will British industry get the home market encouragement it needs to bid for the business? Speculation has been revived by the Western Region General Manager's disclosure in the January MODERN RAILWAYS that he is "looking around" for something more powerful than 3,300 h.p. to fulfil his essential passenger traffic plans. As we have stressed before, if the BRB has any faith that BR are going to last more than a decade or so, it must be fully aware that a limited fleet of 3,500 h.p.-plus diesels will be needed before long. Elsewhere in this issue an expert reminds us that three years are a desirable minimum for prototype proving. Even the argument that a higher horsepower unit is a luxury at the moment is open to some debate. The constant switching from low to full power to which a 2,750 h.p. BR diesel submits on an average express passenger run, slowing for checks as well as station stops, then frenziedly accelerating to regain a tight schedule, is expensively wearing down the traction equipment. Is a locomotive of this rating really the most economical even on present schedules and loadings, given British operating conditions?

One or two engines?

ON the form a British 3,500 h.p. diesel should take, conflicting opinions are developing. Main-line railway traction service is the most trying environment for a diesel engine. Many seemingly excellent designs, some with unimpeachable records in industrial, marine and heavy automotive plant applications, have slid down the slippery slope of rail traction duty into ignominy or oblivion. Many of the more spectacular or intractable failures have followed fairly soon after moderate increases in power output of engines that until then had had good service records.

In the main, there is unlikely to be any relaxation of axleload limits on BR. Conventional diesel-electric locomotives of the day are already up to those limits and therefore it seems clear that any further uprating can only come from engines of considerably improved specific power, perhaps coupled with a change from d.c. electric transmission, or with a departure from the six-axle format with nose-suspended motors. Of course, BR could, as some other railways have done, accept that the use of hydraulic transmission makes the 4,000 h.p. locomotive a viable proposition within ruling axle-loads, given a really reliable engine running at about 1,500 r.p.m., but its preference is more likely to be for electric transmission. That choice made, the field becomes wide open. A basic decision is necessary first: whether to venture into one of several new fields or to solicit a design making use of known and well-tried equipment. The second, or "better-the-devil-you-know" choice, has been adopted in the new US generation of massive double locomotives on one frame for 5,000 h.p. or more. This solution is not open to BR—or, indeed, to many other systems outside the USA—but it is worthy of very close study as a principle for its promise of comparative freedom from the otherwise apparently inevitable batch of teething troubles.

The least troublesome solution for a 4,000 h.p. diesel-electric locomotive might be a design incorporating two 2,000 h.p. engine-generator sets running at 800 to 900 r.p.m. and moderately rated, gaining the many advantages of using equipment already proved in service. As things stand at present such a locomotive would almost certainly be outside the acceptable weight for six axles, particularly if a train-heating boiler was required. But the Co-Co format is not sacrosanct and, despite some past experiences, it has been demonstrated that the undriven axles in a 1Co-Co1 design can be made to do more useful work than merely support weight. With thoughtful design, their contribution to improved riding and adhesion could be particularly valuable.

If it is insisted that a Co-Co design is the only one, a basic choice lies between using one engine or two lightweight engines. The economics of the single engine might appear irresistible, in which case there is only one engine—the Sulzer 16-cylinder LVA—at present in the field. That is as yet untried, except on the bench, at the output envisaged, even without the possibility of problems with a suitable d.c. generator. For a two-engine locomotive there is a wider selection without, as the French have done recently, departing from the conventional in d.c. generation. For example, a good case could no doubt be made out for an uprated "Deltic". The Type 5 locomotive has plenty in hand in the matter of weight and the engine itself has even more in hand in the matter of potential output.

A single engine likely on BR

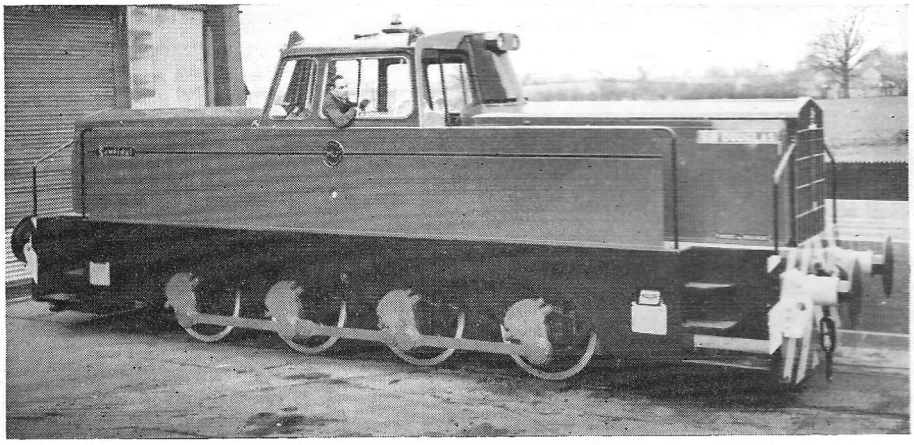
The "Deltic" engine is, of course, comparatively expensive in first cost, with the multiplicity of fasteners required in a light-alloy structure. But with its low demands on day-to-day attention and the quick return of a locomotive to service achieved by its ease of repair by replacement unit, its overall costs are probably much more competitive. Because of its radical departure from conventional traction practice, the "Deltic" is probably unlikely to win universal acceptance, but it is interesting to speculate on what might have been if a structural redesign, substituting iron for aluminium and eliminating some of the "thoroughbred" fussiness, had been undertaken at the time of its first proposal for traction duties. However that might be, any alternative two-engine Co-Co design with conventional electrics would still need to use new-generation engines running at higher speeds and b.m.e.ps., with all that that entails—perhaps the Paxman Ventura or one of the smaller Sulzer LVAs.

The crystal ball hints that BR favour a design based on a single engine and single d.c. generator, probably with provision for electric train heating, simplified braking and other weight-saving features. Such a decision would imply that BR believes that the development time available before the locomotive becomes an operational requirement is sufficient to ensure the avoidance of the worst of the painful past experiences. Certainly, with two of the LVA-powered 2,650 h.p. Type 4s already delivered and three others to follow, BR will soon be accumulating its own service experience with the new Sulzer V12 engine to add to that of the SNCF with a much greater number, by which to assess the potential of the 16-cylinder unit. Moreover, if the new locomotive was introduced initially at 3,500 h.p. with development potential to the higher power, both the working up of engine power and the advance in generator output would be more gradual and therefore less likely to run into trouble.

Whether the decision for a single-engine design would be a good one in the broader sense is open to question. It would sacrifice the advantages of having main components already in wide use, which is a considerable factor in both the cost of providing adequate service backing and the length of down-time for scheduled and non-scheduled workshops attention. It would be less likely to sell well overseas, where increasingly the trend is to order equipment having a long and successful service record elsewhere. As the total market for a 4,000 h.p. diesel-electric locomotive is likely to be small, at least for several years, it is questionable whether insistence on an exclusive specification that might prejudice overseas sales and further increase unit cost is justifiable.

Indeed, with cash for development likely to be less easy to come by and the present emphasis on the vital necessity of exports, perhaps the time has come to ask the fundamental question—whether as a country we can any longer afford to have any major item of equipment developed by or for BR in isolation.

letters



One of two Rolls-Royce "Sentinel" Type DL416 650 h.p. diesel-hydraulic 0-8-0s recently delivered to Lysaght's Scunthorpe works. It is powered by two Rolls-Royce 1,800 r.p.m. Type C8SFL eight-cylinder four-stroke engines, each driving through Rolls-Royce/Twin Disc torque converters. Overall length over buffers is 34ft, width 8ft 6in, weight 65 tons and maximum tractive effort 72,000 lb.

North-West-Scottish services and the businessman

SIR,—The deplorable services which at present exist between Liverpool, Manchester and Scotland, make one wonder at the complacency with which you head a paragraph in your February issue: "More time in Scotland for North-West businessmen."

The Liverpool or Manchester businessman who has to keep an early appointment in Scotland is forced to travel overnight. If he is unfortunate enough to be travelling to Edinburgh, he has to leave the comfort of his sleeper in the early hours—exchanging it for the bleak, dismal isolation of Carstairs Junction. As for the luckless traveller who is so reckless as to travel from Liverpool to Edinburgh at night—well, that's just his bad luck: there isn't even a through carriage.

Day services are poor. An arrival at Glasgow Central at 14.20, or 14.21 at Edinburgh Princes Street, is of no use whatever to the businessman. Certainly, it does not allow him sufficient time to complete a day's business if he has to be back at the station at 17.30 so that he may board a train that will get him to Lancashire the same evening. The services in the reverse direction are not much better. If it is BR's intention to drive the Lancashire–Cheshire–Scottish traffic to the airlines, then they are doing a first-class job. Anyone wishing to travel from Liverpool or Manchester—or even Rochdale or Huddersfield, for that matter—leaving at breakfast time and hoping to arrive by midday—well, just let him try.

What is urgently needed is a fast morning service leaving Liverpool at 7.30 with through carriages for both Glasgow and Edinburgh. A similar portion from Manchester, departing at approximately the same time, could be attached at Preston. There should be also a corresponding service from Glasgow and Edinburgh, leaving at the same times. Arrival times at the Scottish and English cities respectively should not be later than 11.30. Evening departures should not leave before 17.30. The present overall times of 5hr are too long; 4hr should be the maximum. The traffic potential between these cities is surely sufficiently important to merit "Deltic" traction.

London, W.4 ALEX ROSS.

SIR,—The trains between the North-West and Scotland load well with through traffic, but suffer from their frequent minor intermediate stops at such places as Bolton, Ormskirk, Lancaster, Lockerbie, Beattock, Motherwell, and Merchiston or Haymarket. Presumably the argument is that the trains to and from the North-West have the shortest journey and so are the best suited to make these stops. But I should have thought that another line of argument would be that only between the North-West and Scotland is an out-and-home-in-a-day service possible, and that this should be an incentive to provide a fast and attractive service. Even with only the 2,000 h.p. of the English Electric Type 4s to work the heavy trains used, a timing of 4hr end-to-end should be quite possible.

Oxford. J. V. GOUGH.

The Stoke Division

SIR,—In the excellent article on the Stoke Division in your February issue you give details of the passenger services to be expected when the lines through Stoke have been electrified. While the speed of the express trains will be excellent, the interval between the local services will be appalling. Does the London Midland Region really expect local passengers to be eager to use a service which only runs every two hours? If this is all that

they intend to provide, they might as well abandon it now. When will this Region learn from the Southern or Scottish Regions (Glasgow suburban services)? To be successful a local service must run on a frequent strict interval, preferably with at least one train every half-hour. The fact that the intensive service along the South Coast between Brighton and Portsmouth has remained intact shows that frequent and regular services attract passengers. Often when people are making local journeys, they are uncertain exactly what time they will be able to start. With half-hourly service they can afford to miss one train, knowing that they will not have long to wait for the next. If the service interval is two hours, they will go by bus or car.

A look at the map in your article suggests that it might be worth electrifying the comparatively short connection between Crewe and Kidsgrove, so enabling the Liverpool–Crewe local service to be extended to the towns of the Potteries and freight trains between these areas to be electrically hauled.

Camberley. F. O. J. OTWAY.

GE suburban services and the Victoria Tube

SIR,—It is clear that the opening of the Victoria Tube with interchange at Tottenham Hale and Seven Sisters will lead to fundamental changes in the pattern of travel from the Broxbourne area both at peak and off-peak hours. It is not impossible that one-half of present peak hour travellers will wish to interchange.

It is clear that additional stops must be made by the electric trains at Seven Sisters when the new tube is opened but this may attract short-distance overcrowding in the same way as the Edmonton stop (necessary for interchange) does at present. When representations have been made for improvements to services to Liverpool Street the rail authorities have always (with justice) pointed out that there are no paths for extra trains between Bethnal Green and Liverpool Street. It is doubtful whether diversion of Chingford passengers to the Victoria tube will release any useful paths as Chingford trains are already grossly overcrowded at peak hours.

It is therefore urged that the junction between Tottenham Hale and South Tottenham be restored and that trains (at present necessarily diesel) be run on a Broxbourne–Tottenham Hale–South Tottenham–Seven Sisters–Broxbourne itinerary in both directions. At peak hours these trains could be added without requiring paths into Liverpool Street. At non-peak hours they could replace the Cheshunt–Liverpool Street service and presumably allow one further long-distance train a path into Liverpool Street.

It is suggested that the proposed service stop at all stations. This would enable the existing electric trains to run non-stop from Southbury to Liverpool Street and the existing diesel trains to omit stops where present traffic is light, say at Ponders End and Angel Road. Better still, it might be possible to arrange the schedules so that peak-hour trains could be run serving Broxbourne, Theobalds Grove and Seven Sisters only.

There might be a great advantage if the proposed loop service connected at South Tottenham with the Barking–Kentish Town service, particularly if the Kentish Town end could be extended via Gospel Oak to Willesden Junction. This might open up new traffic for the railway.

Broxbourne & Worsley Ratepayers Association. E. S. CURTIS, *Hon. Secretary.*

Withdrawn fare concessions

SIR,—I was disappointed to see you dismiss opposition to the withdrawal of "free trucking" facilities as "the result of sheer conservatism and failure to realise BR's new role in the national economic life" (*February issue, page* 107).

It seems odd to me that the economic experts should praise such a move as progressive if, in improving the finances of one sphere of "national economic life", they ruin those of another. The public certainly gains nothing.

I am also puzzled that you should think continued reliance on rail transport conservative. In fact what has happened is that, in ridding itself of the supposedly undesirable scenery vans, BR have also lost the paying passengers who travelled with them.

GEOFFREY SKELSEY, *President.*
Cambridge Univ. Theatre Company.

Temporary speed restrictions

SIR,—I read with interest Cecil J. Allen's remarks in the February issue on the effects of p.w. slows on train running. Unfortunately I missed the previous correspondence on the subject, but Mr. Lord's suggestion about raising the restrictions by stages is not without some merit.

This could be carried out simply by altering the configuration of the warning boards on the approaches to a p.w. caution. There would be no need to alter the printed item in the Weekly Engineering Notice as in both the Scottish and the North Eastern Regions trainmen are advised in the preamble to Section A of these notices (speed restrictions) that "temporary speed restrictions may be raised or withdrawn earlier than shown. Trainmen must therefore be prepared to find a higher speed (which may be the permanent speed restriction) indicated at the warning boards and they must work to such speed".

In view of this any speed restriction could well be raised as the works permit until normal running speed is reached, when the visual indications to trainmen could be withdrawn. This would, of course, be complementary to the terminating date shown in the weekly notice. What might lead to serious consequences would be the odd occasion where a District Engineer finds that he requires to restore the original speed restriction after raising it. This could become confusing to trainmen who, after all, must work to their Weekly Notices.

If this system were fully adopted the time of raising of the restrictions would require to be carefully watched by the clerical staff engaged in checking train journals to debit the delays incurred.

As for the p.w. caution on the up line at Chester-le-Street, I agree that it must be frustrating to trainmen to find a restriction in force for what appears to be a greater distance than actually required. Here again the Weekly Notices make provision for such a contingency in that restrictions operative on a distance of approximately a mile carry an asterisk against the particular item. An explanatory note in the Scottish Region Notices reads "In the case of items marked * the warning boards and indicators will be moved as the work progresses." The North-Eastern Notices go a stage further and state that restrictions will not operate over more than ¾ mile at a time.

Edinburgh 12. "RAILWAYMAN".
(Full name and address supplied.)

Floods cut off the Cambrian Coast

SIR,—Mark Bourne over-simplifies the closure of the Carmarthen–Aberystwyth and Ruabon–Barmouth lines in your February issue. Although services between Bontnewydd and Morfa Mawddach were suspended on Saturday afternoon, December 12, they were resumed between Dolgellau and Morfa Mawddach on Monday, December 14. Further damage on the intervening Sunday caused the suspension of passenger services between Ruabon and Dolgellau. Freight services from Ruabon were able to reach Trevor on Monday and Llangollen on Tuesday, December 15; passenger trains recommenced over the same section, and between Bala, Bala Junction and Dolgellau on Thursday, December 17. The section between Llangollen Goods and Bala Junction, however, did not reopen. Passenger services were finally withdrawn from the remaining sections (as were the emergency bus services), as scheduled, on January 18, 1965.

Similarly, passenger trains between Aberythwyth and Strata Florida were suspended on Monday, December 14. The three daily passenger trains from Carmarthen worked to their booked crossing places (Tregaron, Strata Florida and Lampeter respectively), where they connected with buses serving Aberystwyth, before returning to Carmarthen. The service was withdrawn from February 22, 1965.

On both lines through freight traffic (except one Class 4 mails train from Chester to Barmouth) had already ceased when the lines were breached.

Solihull. R. MAUND.

Token exchange on the Highland line

SIR,—In his letter (*February issue*), W. J. Wetenhall is of the opinion that the abolition of tokens would accelerate services on the Highland line. While there may be places where speed is reduced solely to exchange tablets, the speed restrictions at most crossing places are governed by the turnout curvature of the loops. Usually the speed restriction is about 40 m.p.h., but at some loops it is as high as 60 m.p.h.

To eliminate these speed restrictions, the Highland loops would have to be realigned so that one road was straight through, while both roads would have to be signalled in both directions—a costly alteration to save a few minutes.

Aberdeen. N. FORREST.

Is the LMR carrying a can for the WR?

SIR,—I read with interest and some amusement "West Midlander's" letter in the February issue. I have no doubt that the management at Paddington were pleased to lose the responsibility for the lines in the Cambrian area, which must have been a liability; but what of the former lines of the Southern Region which were transferred to the Western Region on the same date? One can hardly imagine that these lines will do anything but add to the "red" column of the Western Region's accounts.

Northolt. R. DENISON.

Example from the USA?

SIR,—Does not President Johnson's recent request to Congress for millions of dollars to develop high-speed inter-city railways render our present conception of making railways economically viable outdated? What happens in America today will take place here in 20 years' time—including their difficulty with commuter traffic.

It appears that the taxpayer is going to have to afford some form of mass transportation after all. The problem might as well be tackled now by building trunk and commuter railways for the future during the next 20 years, instead of landing ourselves with a problem of the magnitude which now faces America.

Bishopbriggs. S. RICKARD.

RAILWAYS' CROSS-CHANNEL CAR BUSINESS BOOMING

Right: The cardmaster apparatus, in which a card is maintained for every car space on every scheduled ferry sailing throughout the year, at the Southern Region's Grosvenor Gardens, London, car ferry centre.
Below: Artists' impressions of two of the new ships that will be joining British and French Railways cross-Channel car-ferry fleet this year—on the left, the French Railways *Villandry;* and on the right the British Railways *Dover,* which was launched on Tyneside on March 17.

ANOTHER stage in the £5m British and French Railways development of the Newhaven–Dieppe car-carrying service and expansion of its capacity from 200 cars a day each way last summer to 760 each way this year was passed on February 7, when French Railways' second new car ferry, the *Valençay*, sister to the *Villandry*, was launched at St. Nazaire. It is one of six new car ferries that will go into the cross-Channel service of various operators this summer.

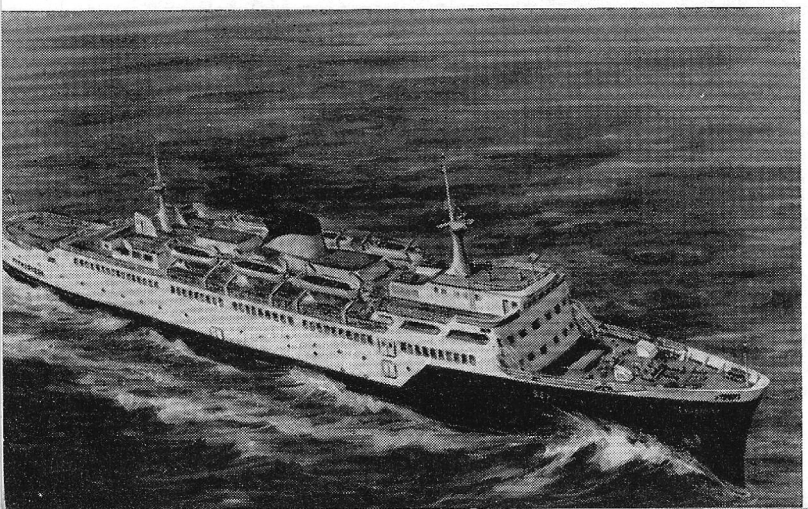
When the results of last season's cross-Channel car-carryings were totted up, there was some suspicion that the boom had begun to tail off and that the operators' future plans might be outrunning the potential. The tonnage now launched or under construction will increase the car capacity by considerably more than the 50 per cent addition it will make to the number of ships in use, and so far as the railways are concerned, last year's carryings were considerably less than this amount up on those of 1963. The BR and SNCF cross-Channel ferries moved 488,410 cars as against 426,360 the previous year, a rise of 15 per cent, and just over 600,000 tons of freight, or 18.4 per cent more than in 1963, while the passenger figure was more or less static at 3.29m in 1964, as against 3.25m in 1963. On its busiest day, Dover handled 6,851 vehicles.

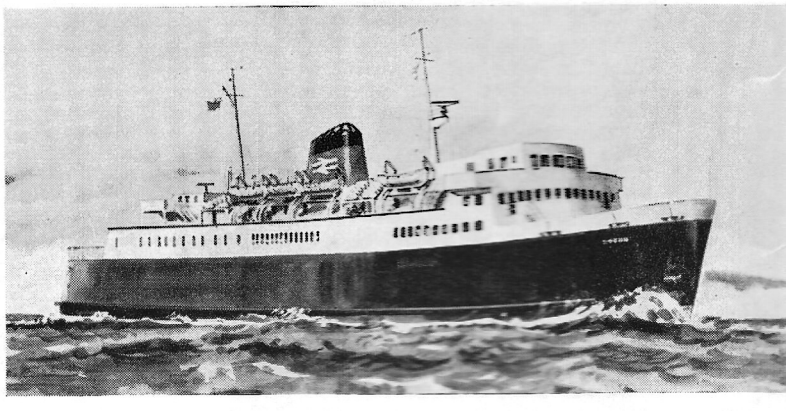
However, a striking initial response to the 1965 Southern Region publicity campaign for its Continental car-ferry services, which has featured a busy direct mail campaign to previous customers as well as intensive press and TV advertising, supports a theory that steep increases in costs of living beyond the Channel and General Election uncertainties in this country may have temporarily depressed last year's business. In the first two weeks of last January, the SR's car ferry booking centre in Grosvenor Gardens, near Victoria Station, London, received 20,000 enquiries, as against only 6,000 in the same fortnight of 1963; and to date advance bookings are 17 per cent higher than at the same juncture last year, while 60 per cent more enquiries about the car-ferry services have been received.

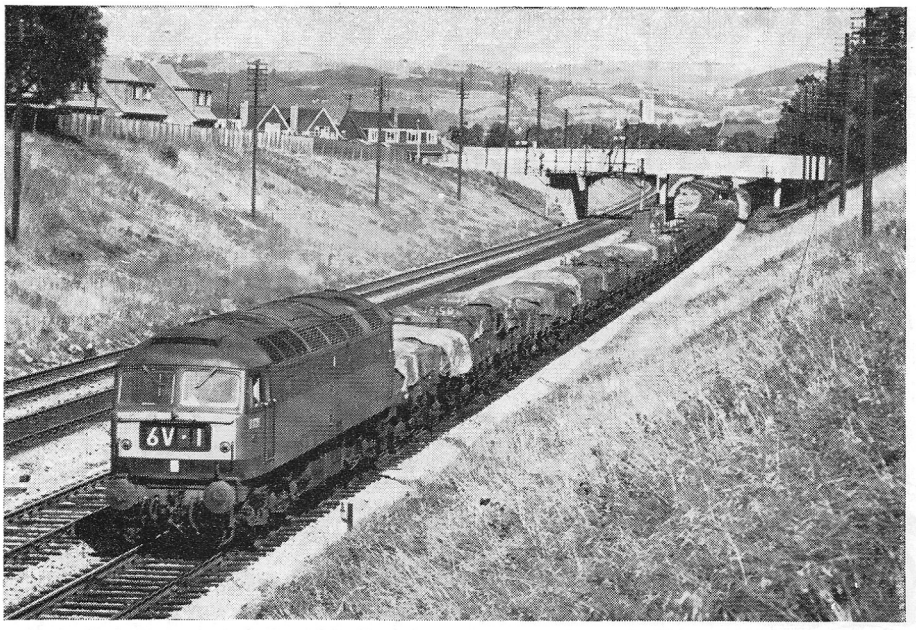
Booking of passages on the BR/SNCF car-ferries has been streamlined and simplified. Tickets and places can now be booked on the spot at the BR Travel Centre in London's Lower Regents Street, and also at a number of main BR stations, as reported last month. The Grosvenor Gardens, London, car-ferry centre, now staffed by 35 full-time clerks, has been equipped with apparatus in which a card is maintained for every car space on every scheduled ferry sailing throughout the year. The clerks are provided with portable telephone-head sets which they can connect to extension sockets in the cardmaster, to enable them to deal promptly and accurately with telephone enquiries about space on ferry sailings. But the substantial increase in capacity on the cross-Channel routes this summer should mean that, except on a few peak days, even motorists who have failed to book their passages in advance should suffer little or no delay at the Channel ports.

Addition of the £1,175,000 *Dover* to the service in July will be the principal development on the Railways' Dover–Boulogne route this year. With a capacity on its two garage decks for up to 205 cars—the largest of any of the cross-Channel ferries—and room for 850 passengers, with a seat for every one of them—the *Dover* will enable daily car-ferry sailings from Dover to be increased from 26 to 32 in the summer peak; each ship will be working up to eight crossings every 24hr. Other improvements on the Dover–Boulogne route include a cut of the car-ferry turnround time from 90 to 75min by more efficient port operation and improved loading. On the other side of the Channel, a second car ferry berth is under construction at Boulogne. French Railways have ordered a new car-ferry to work with their *Compiègne* on the Calais–Dover crossing, but this will not be ready until the 1966 season.

The biggest expansion on the railways' cross-Channel car-ferry routes is concentrated on the Newhaven–Dieppe service, which was initiated last summer by the BR *Falaise* after its conversion from a passenger ship to a car ferry. With the addition of the two new French ships, there will be six sailings each way daily at the height of the season. BR's contribution this year is completion of the new ferry terminal at Newhaven, which was only partially ready for the start of last summer's working. No new developments in BR car-sleeper services are announced—in fact, some scepticism about their attraction for provincial motoring parties travelling to the Channel ports is detectable on the SR—but the French are providing new services from Dieppe. Last year French Railways carried out market research among motorists from this country to determine the probable extent of the market for new trains from Dieppe. As a result, connecting trains will be run this summer from Dieppe to Biarritz, Toulouse, Narbonne and Avignon. A significant freight traffic is also developing on this route, particularly in new export cars and loaded road freight vehicles, and recently experiments have been begun in the use of dollies for the quick loading and unloading of containers.







Brush 2,750 h.p. Type 4 diesel-electric No. D1726 near Cheltenham with a southbound freight on the Birmingham–Bristol main line on August 29, 1964. *Photo by D. Cross*

BRISTOL–BIRMINGHAM FREIGHT DIESELISATION SCHEME LAUNCHED

G. Freeman Allen

AN important cross-country flow of freight traffic started to undergo a considerable modification on March 1. Two important operational changes are integrated. The major alteration is the dieselisation of all freight services over the ex-Midland Bristol–Birmingham main line, which will virtually complete the elimination of steam power from passenger and freight main-line services in the WR's Bristol Division; this was to start in March and should be completed by next September. The other change results from a decision to divert to fresh routes all through merchandise traffic that has been passing over the southern part of the ex-Great Central main line.

Most numerous among the freight services to and from the WR affected by the clearance of the GC route were those between South Wales and Woodford Halse, which are being withdrawn. Their traffic is being absorbed in the comprehensively reorganised freight service via the Bristol–Birmingham main line and Washwood Heath yard, the route now to be followed by all traffic between the WR's Wales Division (except Hereford, which will continue to receive and send its traffic via Shrewsbury) and destinations previously reached via the GC line beyond Woodford. Apart from traffic to and from Yeovil Junction, Westbury, Chippenham and Swindon, which will run via Banbury to and from Washwood Heath, and traffic for destinations south of Woodford, which will be rerouted via Swanbourne (on the Oxford–Bletchley–Cambridge branch), all Plymouth and Bristol Division traffic formerly moving via Woodford and the GC line will travel via the Bristol–Birmingham main line and Washwood Heath.

The first step in the reorganisation of Birmingham–Bristol line freight services was an exhaustive analysis of all freight traffic passing through Bromsgrove, at the foot of the Lickey Incline. On the basis of this analysis, a new train plan was devised to improve the utilisation of manpower and equipment, and to exploit the operational flexibility and increased haulage capacity of diesel traction. The re-routing of GC line traffic was mooted after the Birmingham–Bristol replanning exercise had been started and was incorporated in it. Also taken into account on the WR side was the desirability of diverting freight traffic from the Hereford–Worcester line and the aim of abolishing Gloucester's functions as a staging or assembly and division point for South Wales and West of England traffic—a complete reversal of the earlier WR policy that envisaged establishment of a brand-new mechanised marshalling yard in the Gloucester area at Brookthorpe. Stoke Gifford, an orthodox flat yard which the WR regards as of adequate capacity for the foreseeable future, and Bristol West depot are to be the Bristol Division's principal sorting centres for Wales and West of England traffic. On the LMR side, the redrafted train plan had to be related to the capacity and operational problems particularly of Washwood Heath, and also of Toton and other Midland yards.

The first stage of the resultant train plan, by concentrating the traffic in fewer but better-loaded services, is calculated to save approximately 250,000 train-miles a year. Train staff requirements will be cut by 70 men and the employment of 17 additional 2,750 h.p. Brush Type 4 diesels will be offset by the elimination of 43 steam locomotives. Train loadings have been scheduled on the assumption that a Brush Type 4 can handle the equivalent of 53 loaded 16-ton mineral wagons in each direction; in the up direction, this compares with the previous restriction of an LM Class 5 4-6-0 to 38, a WR "Hall" 4-6-0 to 42½ and a Stanier Class 8 2-8-0 to 46. In practice, length is more often the governing factor in train make-up rather than tonnage, to suit restricted loops and signal sections. Only with the Scunthorpe–South Wales steel trains, which nowadays load regularly to 1,000 tons, can this limitation be ignored.

Initially, the Brush Type 4s will all come from the WR, whose new locomotive diagrams provide for the employment over the Bristol–Birmingham route of eight locomotives based on Bristol Bath Road depot and 16 from the Cardiff Canton allocation; 18 of these are additional to the fleet previously deployed, but the new workings economise in one Hymek Type 3 diagram. From the LMR side, BR/Sulzer 2,500 h.p. Type 4 diesels will at first be the largest types employed, but between now and September these are to be gradually phased out in favour of Brush 2,750 h.p. Type 4s; by the end of the year the latter will monopolise both the express passenger and principal freight services over this route. Some BR/Sulzer Type 2 diesels from Saltley depot are also involved in the new diagrams. The fulfilment of the scheme on schedule is, of course, dependent on the delivery rate of new Type 4s and also on the pace at which scheduled modifications of existing locomotives can be carried out; slow achievement of the latter is already a serious handicap to the WR's maintenance and movements staff, and has put this Birmingham–Bristol freight reorganisation and dieselisation scheme back three months on its originally planned timetable.

The far-reaching nature of the plan has demanded infinitely detailed and patient preparation. On the WR side alone, the preliminary documents setting out the revised workings that were presented to the staff under joint consultation procedure totalled over 200 close-printed, double-foolscap sheets. A comprehensive reorganisation of enginemen's workings is embodied in the scheme, under which WR crews will work deeper into LMR territory than hitherto and crews from Gloucester, which will become the trainmen's crossroads of the plan, will penetrate into parts of the WR to which they have never worked before. Thus, as well as training more men on Brush Type 4s, the WR has had to make a considerable number of engine crews available for fresh route-learning; in all, 400 to 500 men will need to undergo some form of training in connection with the scheme during 1965. The locomotive diagrams are very intricate and many of them will totally ignore Regional boundaries, with the result, for example, that a WR unit will have a regular working to Scotland. The Scunthorpe–South Wales steel trains are now to be worked throughout by a single Brush Type 4 diesel, instead of changing locomotives in the Birmingham area. Brush Type 4s of the WR have already begun through working to the ER on the 18.40 Severn Beach–Immingham (MWFO) and 18.38 Immingham–Severn Beach (TThSO) ICI ammonia tank wagon trains. A correspondent also reports that Brush Type 4s from South Wales have started to haul the Milford Haven–Glasgow St. Rollox oil trains of Esso through to Carlisle; on February 23 and 24 one of them was observed filling in between duties on a Hardendale Quarry–Ravenscraig freight, which took it into Scotland.

The number of depots whose traction and crew diagrams are affected substantially or marginally by the alterations in the working is considerable. On the WR side alone, they include Worcester, Gloucester, Bromsgrove, Pontypool Road, Hereford, Bristol Bath Road, Bath Green Park, Swindon, Severn Tunnel Junction, Ebbw Junction and Cardiff Canton. In view of the scope of the plan, it is recognised that, despite the intensive and protracted planning already undertaken, as much as 15 months may have to elapse between conception and conclusion that it can be operated with total success.

The

ROUTES SELECTED FOR DEVELOPMENT

shown thus

BEECHING PART TWO

trunk line plan for 1984

"The choice is between an excessive and increasingly uneconomic system, with a corresponding tendency for the railways as a whole to fall into disrepute and decay, or the selective development and intensive utilisation of a more limited trunk route system"

THE object of the BRB's latest report, *The Development of the Major Railway Trunk Routes* (*British Railways Board*, 15*s*), of which this is a condensed version, is to set out the information and forecasts necessary to establish how the through route system can best be developed to match the future pattern of rail traffic demand. To this end, the report looks ahead to 1984—a period which is considered to mark the limit of a realistic and quantitative appraisal.

There is no doubt, says the BRB, that an expanding market exists for both freight and passenger transport. But a prime requirement is that the cost of providing the track and signalling per unit of traffic passing over it should be reduced to a level which enables services to be provided on a competitive basis. Opportunity exists, specifically, for expansion of the railway carryings of merchandise, oil, and iron and steel, but only if the services are provided in an efficient manner and at a competitive price. The present network of through routes is under-utilised and, if the railways take advantage of technological progress in signalling and movement, then the disparity between capacity and use will become greater. It is demonstrably practicable to channel the through movement over a reduced network of lines amounting to some 3,000 route miles rather than the 7,500 miles provided today. The overall effect of these changes would be to reduce trunk route costs to about one-half of their present level. Dr. Beeching has put the total savings at £50–100m annually, as against only £18m from the closures of the Re-shaping Report. As important, however, is the effect of concentration of through movement on the costs of associated sidings, yards, stations and depots. The utilisation of locomotives, train crews and other equipment will also be improved by a simplified and intensively used system.

The BRB stresses that the purpose of this study is to select routes for future intensive use, not to select lines for closure. It must not be assumed that non-selected lines are scheduled for closure in the foreseeable future, or that they will be starved of investment. Some are essential feeders to the chosen trunk network—and commuter services are without the scope of this report altogether. Certain of the non-selected routes may, of course, be simplified; Salisbury–Exeter and Newcastle–Edinburgh are obvious instances where double-track may be reduced to single line at some future date.

Publication of this report is not a prelude to precipitate action on a broad front. It is, rather, the exposure of ideas about the way in which the trunk route system should be shaped, and is made for four important reasons:—

(i) So that the selection of trunk routes can be subjected to constructive criticism,
(ii) So that the next phase of development expenditure can be well planned,
(iii) So that any future proposals for trunk line closure, or downgrading, can be seen in a broader context,
(iv) So that commercial policies can be properly developed and customers be given a clearer view of the future.

The Ministry of Transport has emphasised that, unlike the Reshaping Report, the new document is only a basis for future planning. To the extent that it points to specific measures, such as the concentration of investments on particular routes and the downgrading of others, Government decisions will be required before action can follow. It will also have to be examined in the course of other studies which are now proceeding both in the transport field and that of economic planning. The Minister has therefore arranged for the report to be considered by his special advisor on transport planning, Lord Hinton (*see page* 198).

Route duplication inflates unit costs

The existing system of through routes connecting main centres involves a total route mileage of some 7,500, of which 1,400 is quadruple-track or more and 6,100 double-track. In certain instances, routes serve subsidiary purposes as well as their main function. This means that there must be an element of judgment in determining the extent to which duplication exists, but, in the view of the Board, this is the position:

Quadruplicated routes	*Triplicated routes*	*Duplicated routes*	*Single routes*
700 miles	700 miles	3,700 miles	2,400 miles

The utilisation of the through route system compared with the capacity that is available now is assessed as follows:

Type of route	*Miles*	*Present* utilisation*	*Practical* available capacity*
4-track or more	1,400	8½m	20m
2-track	6,100	2½m	8m

* Passenger/ton-miles per route mile per annum.

The extent to which the maintenance of this excess capacity influences the cost of handling through traffics is made clear by the following table in conjunction with the previous one.

Traffic density passenger/net ton-miles per annum	*Route costs per passenger/net ton-mile*	
	4-track route	*2-track route*
millions	*pence*	*pence*
45	.07	—
30	.09	—
20	.13	—
15	.15	—
10	.22	—
8½	.26	—
7½	—	.21
5	—	.30
2½	—	.57

NOTE: The figures quoted are an average, assuming the best and most economical modern equipment and methods.

Studies of road and rail costs indicate that, on the trunk network, route costs should be less than about ⅓d per ton-mile if railway transport is to be widely competitive.

There can be no doubt that BR costs per unit carried are presently inflated because there is a gross excess of trunk route capacity in relation to the traffic pattern, and only about one-third of the total through route capacity is used. Moreover, much of the money that is being spent for the sake of the direct economies which result from modernisation of equipment and installations also has the effect of enlarging route capacity. This very substantial increase, if spread over the through routes as a whole, will considerably increase the disparity between capacity and present traffic levels. Changes in the mode of operation will have a similar effect. Therefore, unless future traffic levels over the through routes are likely to be many times higher than at present, the expenditure of the very large sums of money necessary for the maintenance, renewal, and improvement of all existing through routes, currently running at about £85m annually, cannot be justified, and the concentration of traffic and of development expenditure upon selected routes is clearly desirable.

The bases of the study

In order to match a railway system to known transport requirements, the total traffic must be subdivided into categories which can be regarded as reasonably homogeneous from a transport point of view, and the location and density of the main flows of traffic in each category must be established. Only if this is done can route capacity be provided in the right manner. The best way of providing this information for a period of 20 years ahead was to analyse the trunk transport requirement associated with the present state of the economy, and then to forecast how the present pattern of traffic flows might be modified by global changes in transport demand resulting from growth in the economy, by changes in the pattern of industrial production, and by any major changes in the geographical distribution of population and industry.

Comprehensive surveys were made for the 1963 Reshaping Report to define the flows of the main categories of freight between traffic areas in 1961. To establish the 1964 pattern of rail traffic between main centres of population and industry, this information was used as a background. It was modified in the light of special studies undertaken over the interim period, and checked by comparison with regular statistics of the forwarding of each of the principal commodities by traffic areas, now available to the Board.

Consideration of the future state of the economy—which the Report stresses can only be speculative—led to a number of assumptions and conclusions which influenced subsequent consideration of the likely changes in the present pattern of traffic flows between now and 1984. First, it was assumed that the total population of the United Kingdom will rise from 54.2m in 1964 to 62.5m in 1984. An assumption about the rate at which the economy can be expected to grow over the next 20 years presented some difficulty. As in the Hall Report, the effects of growth rates of 3 and 4 per cent were both considered. This was done to determine to what extent the alternative assumptions influenced the BRB's conclusions, but because it would clearly be wrong to set a long-term development target for the railways which discounted the work of the National Economic Development Council, with an associated risk of underestimating the capacity required, weight was given to the more optimistic figure.

It was assumed that the rate of population growth would be comparatively even throughout the country and that no major redistribution would take place. Although some change was foreseen in the commodity pattern of industrial production, the assumption was made that the geographical spread of general industrial activity would remain the same and that growth would be uniform throughout the country. These assumptions are clearly of key importance in relation to the planning of a transport system. They appear to be justified by the strong and growing tendency towards regional development, and by accompanying governmental efforts to stabilise the population pattern by damping industrial development where population shows a tendency to grow disproportionately fast, and the converse. These assumptions were applied in forecasting the future flows of passenger and of general merchandise traffic.

In addition, special studies were made of the future size and location of industries which are large individual users of transport, such as coal, iron and steel, oil, and power generation.

Both 1964 and 1984 flows of the main categories of traffic were arrived at by considering the probable movements between some 40 centres of population and industry. In assessing the future role of the various forms of transport, i.e., road, rail, air and coastal shipping, a special study was made of the technological and cost changes likely to affect each of them during the next 20 years.

Coal traffic in 1984

It was assumed that the total internal consumption of coal would remain fairly steady over the next 20 years, but that it is more likely to decline than to increase. It was also assumed that the Scottish and North Eastern coalfields would decline in importance, and that a greater proportion of production would be concentrated in South Yorkshire and the East Midlands. The consumption of coal for electricity generation is likely to increase, possibly to 110m tons per annum, and coking coal consumption for steel production should remain at about 20m tons per annum level. It was, on the other hand, assumed that the consumption of coal for other purposes, which require a more widespread distribution of the commodity, would decline to about half the present level.

In the assessment of 1984 coal traffic, provision was made for the main coal-fired generating stations which are at present rail-served and for new coal-fired stations known to be contemplated. Provision was also made for the short hauls to ports of coal passing to power stations which are at present served by coastal shipping. In the main, this resulted in more intensive coal movements within and from the East Midlands, and a new longer-distance flow from Nottinghamshire to the Didcot and Aylesbury areas.

Coal flows to centres of iron and steel production were considered individually, on the basis of forecasts of the probable growth of each centre and of their sources of coal supply. It was assumed that the remainder of the coal consumed in the country will flow to the same consuming areas as at present, although with some change of source.

Thus today's heavy coal flows will persist in 1984, with some changes in their relative intensity, but the more widespread and lighter flows will diminish substantially. Changes in the pattern of consumption and in the location of production are expected to cause a continued fall in the average length of haul of rail-borne coal. This, together with the probability of a decline in total production, leads to the expectation that the total demand for rail movement will be about 5,500m ton-miles, which is in agreement with the Hall Report. The individual flows requiring trunk movement amount to some 3,500m ton-miles.

Iron and steel changes foreseen

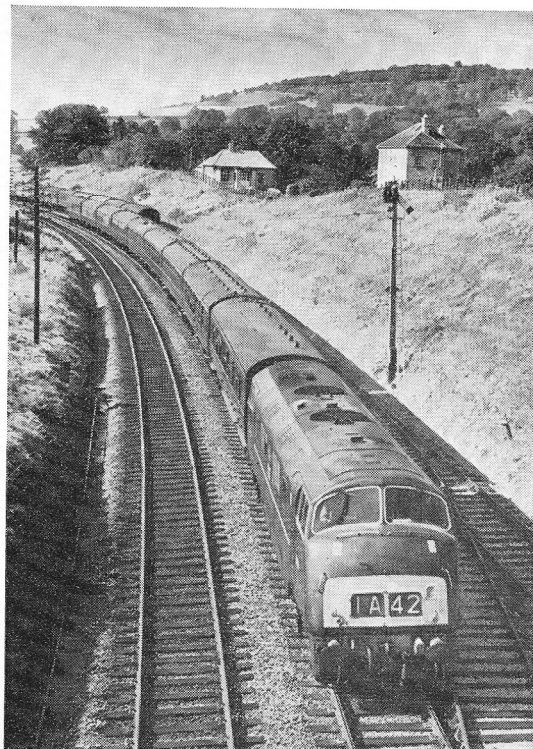
Owing to the decided trend towards the use of lighter metals and other substitutes for steel, the development of new steels, and the expected and necessary concentration of British industry upon products of higher technical complexity and less raw material content, steel production is expected to grow at a lower rate than the average for all industries. There is, at present, a substantial rail movement of intermediate products of the industry, sometimes over considerable distances, some of which are due to imbalances between production stages in individual steel plants. It has been assumed that these flows will decline rather than increase with the growth in total output, since better balancing will be possible as plants develop further. In all, the total rail movement associated with the iron and steel industry is estimated at some 4,300m ton-miles (the 1964 total was 3,300m), of which 800m ton-miles will be on Liner trains and about 500m will be movements of a local nature.

Greatly increased dependence upon oil and natural gas as a primary source of energy and as raw material is expected by 1984. Estimates are necessarily somewhat speculative because of uncertainty about future development in fuel and power, but this does not have such a pronounced effect upon the potential rail carriage of oil as might be expected.

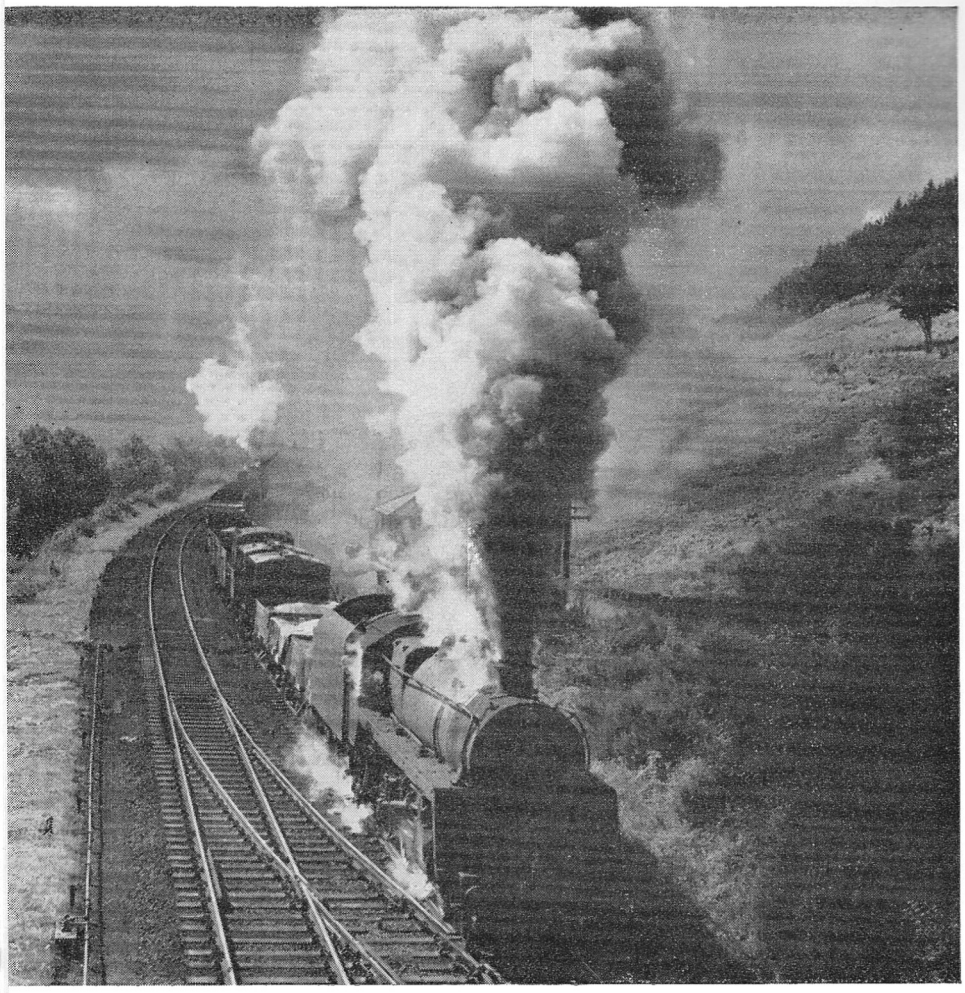
About one-quarter to one-third of the 1984 consumption of oil or natural gas is expected to be in power stations. Because

ROUTES SELECTED FOR DEVELOPMENT—I

Above: Glasgow–Perth–Dundee–Aberdeen: an evening Glasgow–Dundee express crosses the Tay at Perth behind Class A4 4-6-2 No. 60027 *Merlin* in August, 1964.
Photo by W. J. V. Anderson
Below left: Leeds–Moorthorpe: Brush Type 4 diesel No. D1572 passes Lofthouse Colliery with the up "Yorkshire Pullman". *Photo by E. Treacy*
Below right: London–Bristol: The 11.15 Bristol–Paddington approaches Box Tunnel behind a "Warship" diesel-hydraulic on September 28, 1963.
Photo by G. F. Heiron



ROUTES SELECTED FOR DEVELOPMENT—II

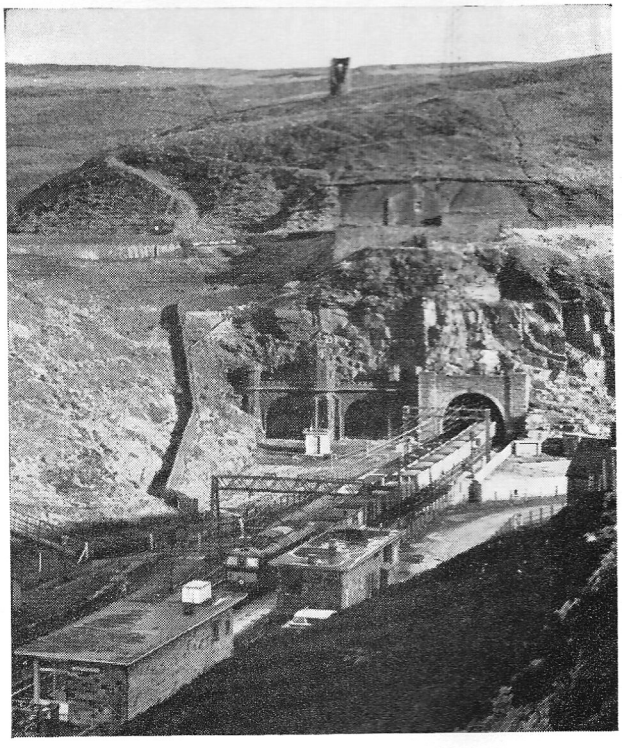


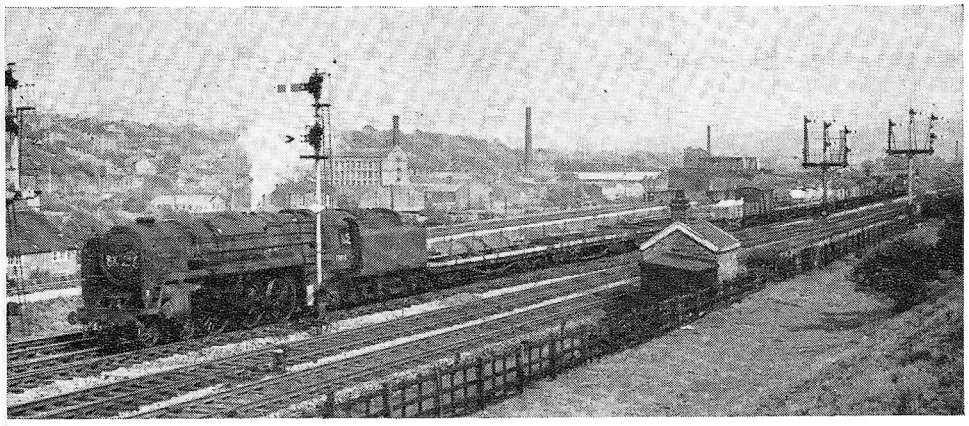
Top: Carlisle–Glasgow: Caprotti Class 5 4-6-0 No. 73151 climbs Beattock bank with a down freight on August 4, 1962. *Photo by C. P. Walker*

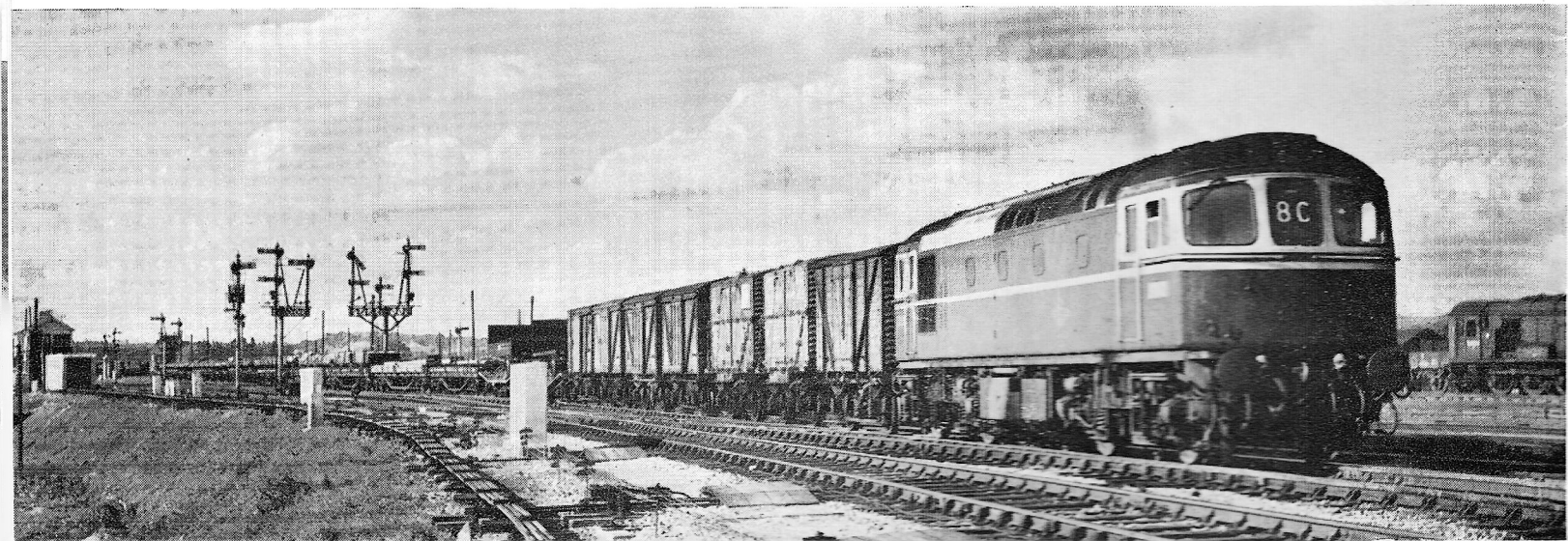
Centre left: The Calder Valley: "Britannia" Class 4-6-2 No. 70018 *Flying Dutchman* near Mirfield with a Healey Mills–Crewe freight in May, 1964. *Photo by J. B. Mounsey*

Centre right: Sheffield–Woodhead–Manchester: Class EM1 1,500V d.c. electric locomotive No. 26010 emerges from Woodhead Tunnel with a coal train on February 2, 1964. *Photo by J. Clarke*

Bottom: Southampton–Reading: Birmingham RCW Type 3 diesel-electric No. D6505 takes the Reading West curve with a southbound freight from the WR to the SR on October 17, 1964. *Photo by G. T. Robinson*







the sources are likely to be outside the country, most, if not all, of the generating stations consuming these products will be built on or near the coast and contribute no traffic to rail. A similar argument applies, though perhaps to a lesser degree, in the case of the gas industry. In the main, therefore, rail-borne oil traffic will be derived from that proportion of the total which is consumed by general industry, by transport, and for domestic heating. Consumption in these fields is expected to be more than 150m tons coal equivalent by 1984, as compared with 80m tons at present.

BR oil tonnage may treble

It seems reasonable to suppose that there will be, in 1984, some 160 to 180m tons coal equivalent of liquid petroleum products requiring distribution within the country, which means an actual tonnage of 95–110m. It also seems reasonable to suppose that the geographical pattern of consumption of this oil will broadly match the distribution of population and industry, except that some of the larger individual users of oil will be located near refineries, as they tend to be at present. It is virtually certain that all the refineries supplying the demand will be on the coast.

The very heavy flows (i.e., flows of several million tons per annum between main centres) are likely to be carried by pipe-line, over both short and long distances. The break-even level of flow between rail and pipe-line transport will depend upon the regularity of the flow and the nature of the products handled, but it is likely to be about 2 or 3m tons per annum. Final distribution to smaller consumers will, generally, be made by road. On the other hand, there will be a great deal of potential rail traffic, in flows ranging from about 10,000 to 3,000,000 tons per annum, from refineries to depots and direct to medium and large consumers.

Within this range, movement in trainload quantities will compete favourably with either road or pipeline transport, and the railways can expect to attract most of this traffic to inland destinations. The probable 1984 flows of rail-borne oil traffic amount to some 2,000m ton-miles, as compared with an existing ton-mileage of only 700m. It is considered that new operating methods and rates recently introduced may, in time, create conditions for an even larger increase in this traffic.

Merchandise and Liner trains

General merchandise offers very substantial traffic potential at present and this is expected to grow roughly in proportion to the growth of the economy. By 1984, it is expected to be about 120 per cent higher than now, if an average growth rate in the gross national product of 4 per cent per annum is achieved. At present, total railway freight in this category amounts to some 40m tons, of which about two-thirds is through movement between main centres and one-third local movement.

This traffic is spread more uniformly between the main centres of population and industry than coal, oil, or iron and steel traffic. Therefore, it offers traffic potential to a greater part of the railway trunk route system than any of the other three freight categories, and in this respect does more to support routes required for inter-city passenger traffic.

General merchandise is the traffic for which competition between road and rail is bound to be most vigorous, and where most needs to be done to ensure that each form of transport provides those services for which it is best suited. An important factor in assessing the roles of the two forms of transport is the extent to which road operators are called upon to cover the cost of the roads which they use and the BRB has already expressed its views on this issue. Nevertheless, no general increase in road taxation has been assumed in this Report.

At present, some 70m tons per annum of freight are carried by road in direct trunk hauls for distances over 100 miles, and about 46m tons per annum are carried more than 150 miles. Only a part of this traffic can be regarded as suitable for movement by Liner trains because they will have their greatest advantage only over the longer distances between main centres, where they will cater for heavy traffic flows, and because certain commodities will require specialised road conveyance.

After taking these three factors into account, it is estimated that some 19m tons per annum of the existing traffic will be transferred to Liner train services as they build up. Most of this will be traffic moving 150 miles or more, but particular circumstances will enable the railways to attract traffic moving over somewhat shorter distances.

Some of the existing rail traffic is also suitable for transfer to Liner trains. This will be derived partly from wagonload traffic, but also from the bulking of goods sundries and parcels traffic. The volume of existing traffics suitable for transfer is estimated to be 7m tons per annum.

Thus, if transport demand were to stay static at its present level, Liner train traffic would be expected to grow to a total of about 26m tons per annum. If, however, total traffic demand grows by 120 per cent by 1984, it is expected that Liner train services will take their full share of such growth and that they will then carry some 57m tons per annum. The average length of haul for this traffic will be about 200 miles, and the total ton-mileage will be about 12,000m. If the charges for trunk road use were increased for the larger freight vehicles generally, this would tend to augment the long-term assessment of Liner train potential and, under such circumstances, the 1984 Liner train tonnage might reach 80m. Such an increase in train mileage would be absorbed within the spare route capacity provided by the route selection which is described subsequently.

The total volume of all traffic freight movement by rail between main centres in 1984 is put at 24,500m ton-miles per annum, compared with 12,000m ton miles in 1964.

Slight fall in passenger traffic?

The present flows of passengers on scheduled rail services between main centres amount to about 30m passengers per annum, yielding gross revenue of about £60m. In considering the effect of the future passenger traffic demand on the railway trunk system the BRB has concluded that stopping services on trunk routes will decline. Important local services will of course remain, particularly commuter services serving major centres, but these will require special consideration.

Although it is difficult to assess the total volume of inter-city passenger traffic likely to develop by 1984 with any great precision, it seems reasonable to assume that it will be at least twice as great as it is at present. However, the railways' share is likely to decline substantially. For flows between major centres over 200 miles apart, air transport is likely to take an increasing proportion of the total traffic. This applies particularly to business traffic, which is relatively insensitive to price but much influenced by speed. The effect of air travel on the Anglo-Scottish rail services by day is already very pronounced and is likely to increase, but the effect on sleeping car services is, and is likely to remain, far less marked.

With improvements in roads and growth in car ownership, partially offset by urban road congestion, further erosion of the shorter distance inter-city traffic on rail is likely over distances below about 100 miles or so. On the other hand, as a consequence of the economy becoming increasingly car-based, expansion can be expected in the conveyance of accompanied motor-cars—whether by day or night services.

The role of the railways will be to concentrate upon the provision of bulk transport over routes of heavy demand, and over medium to long distances. By so doing, they will be able to provide a cheaper alternative to air on certain longer routes, and a faster and more comfortable alternative to road over intermediate and long distances, while leaving shorter distances and cross-country journeys to coaches and the private car, which these forms of transport are able to cover more economically. Only by so doing will it be possible for the railways to keep fares at an attractive competitive level, with an optional premium for a luxury standard of accommodation. The services will be frequent, will give a high standard of comfort and will normally operate at point-to-point speeds of at least 70 m.p.h.

Having regard to all the foregoing considerations, it is estimated that the total volume of demand for inter-city travel on rail will fall slightly from its present level of 5,000m passenger-miles by 1984, but this total seems likely to be concentrated even more heavily into a few main flows.

Modernised trunk route capacity

The closeness with which trains can be spaced along a route and the average speed at which they move depend upon: the type of signalling; the performance of tractive units; the design

of rolling stock—with particular regard to running speeds and braking characteristics; the permanent way—in so far as it affects permitted speeds and the time required for track maintenance; the mix of train speeds and the effect of train stops; and terminal capacity.

Signalling is of major importance. Most of the existing routes are mechanically signalled and are controlled manually from a large number of signalboxes sited in proximity to stations or level crossings. In consequence they are unevenly spaced and the effect on line capacity has been determined by a ruling section, i.e., the longest time taken to run between controlling signals. The aim of modern signalling is to sub-divide a route into portions in such a way that the time taken to pass through each portion is about the same and to adjust signal spacing to the speed and braking characteristics of the trains which the route carries. If signalling and rolling stock are modernised in harmony, the effect on route capacity is very substantial. Even so, the potential capacity can only be realised if the train speeds are either high and uniform, or, at next best, if the operating pattern is such that trains in a limited number of speed bands can be grouped into "flights".

Speed ranges of the future

The present and planned future distribution of trains in speed bands are:

Average speed of types of train

Type of train	Average Speed	
	1964	1984
Passenger services on trunk routes ...	30–60	50 or 70
General merchandise	20–40	50
Oil	20–30	50
Coal	15–30	35
Iron and steel—raw materials	20–30	35

Distribution of total trains over speed bands for trunk routes in general

1964		1984	
Average speed	% of total trains	Average speed	% of total trains
60	8	70	15
50	19		
40	29	50	70
30	33		
20 or less	11	35	15

It would be wrong to imagine that the average mix of speeds is one which applies on all routes or even that the mix will remain constant over the whole of the day and night on one route. On some routes it is envisaged that freight only will be moved—and then all at one speed—a feature which means an above-average increase in potential line capacity.

In practice, too, the working capacity of particular routes is affected by joining or splitting of routes, the nature of the allowances which have to be made for contingencies arising from failure and delay, and the provisions which have to be made for maintenance of the track and signalling, any of which may be peculiar to the route.

The present average loading of double-track trunk routes is only some 2.5m passenger/ton-miles per annum, which, with present levels of train loading, represents about 40 trains per day in each direction—only one train every 36 min—whereas the capacity of such routes today lies between 70 and 100 trains per day on each track. The workable capacity of a modernised double-track route, with the pattern of traffic and operation envisaged for the future, is calculated to range from 140 trains per day in each direction up to 200 in favourable circumstances. On four-track routes, higher frequencies per track are more easily attainable because additional running lines facilitate the segregation of trains in different speed bands, and one pair of tracks at least can be used for a single speed band. On four-track routes, therefore, the operation of 350 or more trains per day in each direction can be safely allowed for.

The other factor influencing effective route capacity is train loading. Apart from the physical ability to run large trains, changes in the future traffic pattern and in the concentration upon services catering for the bulk flows of both freight and passenger traffic will also facilitate better loading of larger trains. The present and expected future loading of trains of various types is expected to be:—

Type of service	Payload	
	1964	1984
Inter-city passenger	150 p	250 p
Stopping services on trunk routes ...	60 p	—
General merchandise	100 t	400 t
Coal	500 t	1,000 t
Iron and steel—raw materials ...	600 t	1,000 t
Oil	450 t	1,000 t

The selected trunk routes

As a prelude to the selection of trunk routes to carry the expected traffic flows, the flows of various forms of traffic were converted into trainloads, so as to establish the rail route capacity necessary to handle them. The forecast demand for route capacity was then considered in relation to the potential capacity of the existing through routes.

The process of selection involved consideration of the following factors:

(i) the extent to which existing routes coincide with the principal traffic flows of the future;
(ii) the comparison of the workable capacity of the alternative routes with the number and type of trains expected to arise from the future area-to-area flows;
(iii) the service of important intermediate centres;
(iv) recent expenditure on route modernisation, such as track improvement, electrification and resignalling;
(v) the necessity for large items of future expenditure on trunk routes;
(vi) physical characteristics of the routes; the incidence of bridges, tunnels, viaducts, of ruling gradients, and features likely to restrict speeds permanently;
(vii) "network" considerations: the way in which routes selected fit into the future railway trunk network; and
(viii) the extent to which changes in the trunk system may result in greater lengths of haul.

Substantial movements are expected to occur between London and Scotland, London and Manchester/Liverpool, London and Birmingham, as well as between the Manchester/Liverpool area and Scotland. The demand for trunk trainload movement amounts to about 240 trains per day in each direction at the southern end near London, decreasing to about 130 trains on the section north of the border.

The LMR West Coast route is able to fulfil the needs of the trunk flows between all these centres.

Newcastle–Scotland via Carlisle

Another flow of traffic which stands out is that passing from London through the main areas, East Midlands and South Yorkshire, on to the Tyne and Tees area. The daily number of trunk train movements expected will be in excess of 100 at the southern end, with rather less north of York. The route selected to cater for the traffic flows in this group is the East Coast. Scope exists for channelling on to it freight traffic now passing to the South via the Doncaster–Cambridge–London line, and some from the Midland. The data of area-to-area movement of trainloads of traffic indicate that the route would be less heavily used north of Newcastle and that through movements to and from Scotland could be provided for by development of the Newcastle–Carlisle line.

The area-to-area flows in trunk trainloads show substantial future movements between Leeds, Sheffield, Nottingham, Leicester and London. Between Sheffield and Chesterfield the route is expected to carry some 130 trunk trains daily each way. The number of services continuing south from Chesterfield towards Leicester will be of the order of 80 trunk trains per day each way.

The route best equipped to meet the demands is the Midland

route, which is selected for development between Sheffield and Leicester. At the northern end, the route selected between Leeds and Sheffield is the ex-LNER Leeds–Doncaster main line as far as Moorthorpe and from Moorthorpe via the ex-Swinton & Knottingley joint route into Sheffield. The first part of this route is selected, in any event, as a link between the West Riding and the East Coast route. At the southern end, the centre section of the Midland route selected for development is connected to the West Coast electrified route at Nuneaton, with the object of achieving a concentration of the available trunk trainloads on that route.

Bristol is selected route to West

Trunk trainload movement between the London area and the traffic centres in South Wales and the South-West is expected to give rise to some 80 trunk trains per day each way. For these the route via Reading, capable of serving South Wales and the South-West (via Bristol and Taunton), provides the best means by which the principal traffic flows can be concentrated whilst at the same time connecting all the main centres involved.

The area-to-area movement of trainloads indicates the need to select a route for development which joins the North-East and the South-West of the country. This movement reaches a peak of about 130 trunk trainload movements per day in the section between Derby and Birmingham. The route passing through Leeds, Sheffield, Derby, Burton, Birmingham and Gloucester, at which point diverging lines continue into South Wales and to the West Country via Bristol and Exeter, has been chosen. Between Leeds and Chesterfield it is common with the route between Leeds and Leicester described above and already selected. By its selection all the principal centres of population and industry on the NE–SW axis of the country are served by one route. At different stages, good possibilities exist for the concentration of through traffic flows at present passing on other routes. For example, between the South-West and Birmingham the through movement over the routes via Barnt Green, via Honeybourne and via Worcester and Hereford can be concentrated with advantage on the route selected. Technical improvements in power, rolling stock and signalling combine to reduce the restrictive effect of the Lickey incline south of Birmingham, which today inhibits loadings.

Two trans-Pennine routes

The forecast of train movements from East to West across the industrial middle of the country reveals how substantial these movements are expected to be—amounting to some 160 trunk trainloads daily. This will approximately equal the future workable capacity of one of the five main trans-Pennine routes. Nevertheless, because of the shortness of the trunk haul relative to the size of the catchment areas at each end, adoption of one route only would necessitate considerable extra train mileage. For that reason it is prudent to select two routes for long-term development.

The routes selected are:

(*a*) the electrified route between Sheffield and Manchester, passing through Penistone and Woodhead, over which dense flows of freight can be achieved by diverting traffic from alternative routes and by reducing the number of speed bands in which trains operate over it. The route is well sited to cater for most of the flows from the Yorkshire and East Midlands coalfields into Lancashire. The route also gives a good connection to the Liverpool area;

(*b*) the Calder Valley route passing through Bradford, Halifax, Sowerby Bridge and Rochdale, which is able to carry the flows from the east side of the Pennines to the North Manchester area and Lancashire, and also provide a through link between the West Riding and the main Anglo-Scottish West Coast route at Preston.

The data of area-to-area flows indicate the need for through trunk routes betwen the Humber and the Mersey. At the eastern end, scope exists for concentrating flows between the centres of South Yorkshire and the Humber; at the western end, through flows between Manchester and Liverpool call for the selection of one or two routes on which trunk traffic might be concentrated instead of perpetuating the five through trunk routes which exist today. In this, as in all cases, it is necessary to consider the way in which the selected routes fit into the trunk system as a whole. The trans-Pennine routes selected for development are entirely compatible with the provision of throughout Humber–Mersey trunk routes.

Channel Tunnel to the Midlands

Development in the Hampshire area, the expansion of the port of Southampton, and oil refining developments on the Solent, require the selection of a direct route to the Midlands. The route selected follows the line to Basingstoke, thence via Reading and Didcot to Birmingham. The northern part of this route will form part of the link between the Channel Tunnel Terminal and the Midlands.

The selection of the West Coast line as the main Anglo-Scottish route permits Glasgow, Perth, Stirling, Edinburgh, Dundee and Aberdeen to be served by one route, thus permitting the maximum concentration of traffic from the south.

To exemplify the processes of choice which were followed in all cases, and the depth of the study, three areas are dealt with in greater detail in the Report. These are: the trans-Pennine routes; the routes between Manchester and Liverpool; and the routes between Birmingham and the South-West.

Factors in the trans-Pennine choice

A survey of the five trans-Pennine routes—Calder Valley, Diggle, Woodhead, Hope Valley and Peak Forest—under review has revealed that no large items of maintenance expenditure are likely to be incurred during the next 10 years. All embody substantial engineering structures, but those on the Woodhead route in particular have been renewed in recent years with a consequent reduction in maintenance costs.

Attention is drawn to the following points of particular interest:

(i) Apart from the 1 in 47 incline at Miles Platting, which is common to both of the northern trans-Pennine routes, in general the gradients via Hebden Bridge are less severe than via Diggle. On the southern route, all heavy freight trains via Peak Forest require an assisting locomotive for 15 miles between Rowsley and Peak Forest.

(ii) The small number of permanent restrictions on speed over the Woodhead route compares favourably with the large number of such restrictions via Peak Forest.

(iii) The large number of tunnels on the Peak Forest route —23 in all—affect the maintenance costs for the route.

It is of interest to note the levels of freight traffic of all classes passing over each of the five routes today. The following table sets out the present situation:

Route	'000 tons per week
Calder Valley	70
Diggle	40
Woodhead	170
Hope Valley	45
Peak Forest	85

The conversion of future traffic flows into trainloads per day in each direction, produces a total demand of rather less than 200 westbound trunk trains (passenger and freight), which will just about saturate the future maximum workable capacity of one trans-Pennine route. The volume of eastbound traffic is smaller, as the predominating traffic is the flow of coal from Yorkshire and the East Midlands into Lancashire.

An important consideration taken into account in making the Calder Valley route one of the two trans-Pennine choices was its dual function of giving access between the West Riding and Manchester, and providing a through connection with the main Anglo-Scottish West Coast route at Preston. The alternative northern route via Diggle is unable adequately to fulfil both these requirements. Further advantages in favour of the Calder Valley route are that in general it has less severe gradients and, moreover, the total population of the intermediate centres is double that covered by the Diggle route.

As for the southern routes (via Woodhead, Hope Valley and Peak Forest), the most important considerations concerning

the route via Woodhead are: its directness for traffic flowing from the East Midlands, and centres to the east and south, to the Merseyside area; the favourable rail connections at each end of it; the post-war modernisation of the route; and the scope for increasing the payload of freight trains from 750 tons up to the limit of present coupling strength—about 1,100 tons (the additional power can be provided by adapting the existing electric locomotives to work in multiple).

It was necessary to calculate in respect of each route the maximum workable capacity in relation to the total estimated demand for trainload movements. Over the Calder Valley route some 30 per cent of the trains are expected to run at an average speed of 35 m.p.h., with the bulk of the remaining 70 per cent averaging 50 m.p.h. Inter-city express passenger services, running at average speeds of 70 m.p.h., will account for about 10 per cent of the total movement. On the Woodhead route the majority of the future trains are expected to be in the heavy freight class, running at an average speed of 35 m.p.h.

The calculations of potential route capacity in the future are summarised below:—

	Woodhead (trunk trains per day/each way)		*Calder Valley (trunk trains per day/each way)*	
Theoretical capacity		320		370
Deductions for:—				
(i) Mixed speeds	50		100	
(ii) Junction/terminal confliction ...	35		50	
(iii) Maintenance and contingencies	35		35	
	—	120	—	185
Workable capacity		200		185

The concentration of trunk flows over two routes is likely to give rise to a limited increase in train mileage. This would, however, be compensated by improved utilisation of locomotives and train crews operating over a simplified trunk system.

As in all cases under review, it was necessary to consider the way in which the selected routes would fit into the trunk system as a whole. At its eastern end the Calder Valley route feeds: to the north via the selected Leeds–Church Fenton–York route; to the east via Selby to Hull; and to the south via the selected link with the East Coast route at Doncaster. At its western end the route feeds to the north via Preston to the Anglo-Scottish West Coast route; to the west via the selected route to Liverpool; and to the south via the newly electrified route to Crewe.

Electrification of the CLC?

The Woodhead line at its eastern end feeds: to the north via the selected Sheffield to Doncaster link on to the East Coast; to the east particularly to Immingham (the port selected for export coal shipment) and the steel centre at Scunthorpe; and to the south via the Sheffield–Retford link on to the East Coast route, and via Sheffield to the selected route serving the East Midlands coalfield area. The ex-Cheshire Lines route between Manchester and Liverpool has been proposed for development and this is reached by branching at Godley to provide a through link to the docks at Liverpool, which would also serve the important intermediate industrial centres. This through route by-passes the Manchester complex on its south side and secures many operational advantages by so doing. A further feature influencing the selection of the Woodhead route is the fact that scope exists for the westward projection of the trans-Pennine electrified system via the Cheshire Lines route to Liverpool—a step which would improve the utilisation of the existing electric locomotives.

Two Manchester–Liverpool routes

A survey of the five routes between Manchester and Liverpool—via Wigan and Kirkby; Tyldesley and St. Helens; Newton-le-Willows and Earlestown; Irlam and Warrington; and Lymm and Widnes—revealed no large items of maintenance expenditure as likely to be incurred over the next 10 years. The levels of freight traffic passing over each of the routes under review today are:

Route	*'000 tons per week*
Via Wigan	25
Via St. Helens	20
Via Newton-le-Willows	20
Via Warrington	30
Via Widnes	35

The conversion of future traffic flows into trainloads per day in each direction produces a total demand of some 100 trunk trains (passenger and freight) each way. Future traffic in the area may be grouped in three flows: between Manchester and Liverpool; from Manchester and Liverpool to the north; and from Manchester and Liverpool to the south. The third of these is already legislated for and will pass on to the main Anglo-Scottish route at Crewe or, in the case of Manchester, may pass also via Stoke. For the other two, it would be preferable ideally if one route could combine the service of the majority of important centres of population and industry, and the long-life collieries in the area, and also provision of a connecting link from Manchester and Liverpool to the north.

No one route, however, fulfils all requirements. Thus whilst the total trunk flows could be accommodated on one route, it is considered prudent that two routes should be developed—one to serve the majority of the important intermediate centres, and the other to provide connections with the collieries in the area and through links to the north. The two routes which together best fulfil these requirements are the route via Warrington and that via St. Helens.

Further advantages of the route via Warrington are: the favourable arrangement of connecting lines at the west end of the route permitting the serving of the docks areas; the fact that it lends itself to the diversion of the "trans-Pennine" diesel service, which would add to the density of the Warrington route; and that it provides a through route from Liverpool to Sheffield, by connecting with the Woodhead electrified route at Godley.

There are no capacity difficulties for trunk services on the two selected routes. The Warrington route would cover services between Manchester and Liverpool; the route via Wigan would be adequate to cover services to and from the north. In the case of the route via Warrington, 75 per cent of the services are expected to run at an overall average speed of 50 m.p.h.; the remaining 25 per cent are expected to be fairly evenly divided between inter-city passenger expresses and "heavy" freight services.

A survey of the three possible routes between the West Midlands and the South-West has revealed no large items of likely maintenance expenditure during the next 10 years.

The levels of freight traffic today over each route are:

Route	*'000 tons per week*
Via Barnt Green and Gloucester	90
Via Worcester and Hereford	90
Via Stratford-on-Avon and Gloucester ...	60

The conversion of future traffic flows into trainloads in each direction produces a total demand of some 45 trunk trains per day between the West Midlands and Bristol, and a similar number between the West Midlands and South Wales. Of the alternatives, the Barnt Green route, except for the Lickey Incline, is more easily graded and is shorter—hence it is also a good Birmingham–Bristol inter-city passenger route.

Approximately 70 per cent of the trains from the West Midlands to the South-West and South Wales will have an average speed of 50 m.p.h., the remaining 30 per cent being divided equally between trains having an average speed of 35 m.p.h. and 70 m.p.h. The practical capacity of the Barnt Green route under these conditions of speed mix is calculated to be about 140 trains per day in each direction. Therefore, with a future load of 90 trains each way, spare capacity will exist even when both Bristol and South Wales trunk trains are routed over the Birmingham–Gloucester section.

The selected routes will have in 1984 a margin of spare capacity which varies but which is in no case less than 25 per cent of the capacity provided. It is of interest to note that the estimated overall effect of cutting out duplicate routes would be to increase trunk train mileage by only about 3 per cent.

"The most important contribution to transport thinking ever made in this or probably any other country"—that is the assessment of the BRB's trunk route survey by Sir John Elliot, the former Chairman of the BTC's Railway Executive and subsequently of London Transport. But the survey will remain merely an exercise without a change in political attitudes to the nation's transport

A great opportunity—but will it be wasted?

SIR JOHN ELLIOT

CHAPTER two of British Railways Board's Look at the Future (though they do not call it such) is so important for Britain as a whole that it deserves the fullest attention and most objective criticism of Parliament, industry and the general public. Whether it will get it, or, as unfortunately is often the case, be blown up into hysteria and partisan argument is another matter.

The study (for it is not, as yet, a plan) is fully set out on preceding pages. I do not propose therefore to deal with it piecemeal, or to comment on it in any detail, but rather, as one who has borne some of the heat and burden of the early days of nationalisation, to take a backward and a forward look at the major aspects of the transport problem of Britain, with emphasis, naturally, on the part which BR has played in the past and should play in the next 20 years (as in the study); and to draw attention to the danger which threatens transport if political considerations are permitted to override all other issues, as they have done hitherto.

In the first place it is necessary to hold a magnifying glass over the three most important paragraphs in the new study, if its full significance is to be properly grasped. These are:

(a) "There is a gross excess of trunk route capacity in relation to the traffic pattern, and only about one third of the total through route capacity is used."

(b) "The purpose of the study is to select (main) routes for future intensive use, not to select lines for closure."

(c) "The real choice is between an excessive and increasingly uneconomic system, with a corresponding tendency for the railways as a whole to fall into disrepute and decay, or the selective development and intensive utilisation of a more limited trunk route system." (i.e. to use only 3,000 main trunk miles to accommodate the bulk traffic to be moved, instead of 7,500 miles as today).

Only if these pregnant essentials are constantly borne in mind can the right answers be found to Britain's transport problems, which are urgent.

All transport must be examined objectively

The battle of rail versus road/air should no longer be a fight to the death; the merits and demerits of each form of transport *must* be objectively examined in the light of knowledge and of fact, each arising from the kind of exercise which has produced the BR study, under the far-seeing and logical inspiration of Dr. Beeching. *The study is much more than just another bite at the problem; it is the most important contribution to transport thinking which has ever been made in this or probably any other country.*

It is always wise, in considering the future (which is what the BR study does), to look back at what has happened in the immediate past, i.e. in the last two decades in this case. Railway health or sickness, like every other political or industrial situation, has been directly and absolutely influenced, for good or evil, by the things done at the beginning and since. It is essential, in planning our public transport system for the future, that we remember and learn from the mistakes of the past.

When, in 1948, Mr. Attlee's Socialist Government nationalised the four big railway companies, they gave only the barest outlines to the new British Transport Commission and the Railway Executive, its agent. These were, briefly, to unify the railways into one network, regardless of former company boundaries or traditions, and to see that the new organisation paid its way. The details were left to the Commission and the Executive. In this the Government were wise.

1947 Act vague on "adequate" service

At the same time, the 1947 Act laid down that "an adequate service" was to be provided, without saying what was meant by the word "adequate" in relation to demand or to the cost of meeting it. From this omission all sorts of difficulties arose, since the railways were faced with fierce competition right from the start. Worse still, the capital necessary to modernise the railways after the war years of over-work and under-maintenance was not forthcoming as it was in France and other war-stricken countries of Europe.

Within less than five years of the vesting date, the Socialists were out of office and the Conservatives were in. Finding themselves unable to reverse nationalisation, they could not resist the temptation to alter the organisation from top to bottom. The central management of BR (the Executive) was abolished in 1953 and wholesale decentralisation was attempted. Such foolishness as "Regional Accountability" was promised, and, of course, proved impracticable.

During this period, however, much fine work was accomplished, such as the authorisation of the BR modernisation plan and the decision to go in for dieselisation and for electrification of the trunk routes, but almost at once Sir Brian Robertson and his colleagues faced the virtual collapse of their two main sources of traffic revenue—coal and steel. The result of this and of the lack of a central management body to control the railways was to convert the genuine surplus of about £40m earned by the Executive in 1953 into a heavy deficit, which increased with frightening rapidity.

Centralisation of management is right

It was then that the new Transport Minister, Mr. Marples, set up an Inquiry into BR, and on that body was Dr. Richard Beeching of ICI. As a result of the Inquiry, the Government reversed nearly all its previous decisions, abolished the Commission, and in its place established the Railways Board, under Dr. Beeching himself. Since then, nearly four years ago, a far stricter centralisation of railway management has been introduced than ever the former Executive had been allowed to dream of, let alone implement. This centralisation, in my view, was, and is, wholly right under the circumstances. Under it, BR—and the nation—have been brought face to face with the facts of life, so far as the railways are concerned.

The principal fact is that it is sheer day-dreaming to believe

that a railway system built largely in the first half of the last century, when railways had an absolute monopoly of all flows of traffic, freight and passenger, could possibly be sacrosanct a hundred years later, a sort of "Holy Cow" which must be inviolate because it used to be so. That point of view is, in my opinion, as unrealistic as is that of those enthusiastic amateur transport theorists who do not believe that Britain needs railways at all.

The BR study now before the public is the logical sequel to the earlier Plan which shocked the nation by its cold douche of branch line closures; both are complementary parts of a far-reaching conception of what railways can and ought to do in the next 20 years, and what, if we are sensible, they cannot and should therefore not attempt to do in a world where road and air transport have transformed the scene.

Conditions of competition must be equal

There remains one big element of doubt, and that concerns railway "profitability". In the world of private railway enterprise, in which I was brought up on the Southern Railway, there was always the strong discipline of the *necessity* to earn a reasonable dividend or there would be no new capital to keep the railway alive. That discipline, which is invaluable in itself as a spur to energetic management, can still be brought to bear on our railways, but *only if the Government of today and of tomorrow creates equal conditions under which the various forms of public transport—rail, road and air—can operate.* This is much easier said than done when about half the transport system is publicly owned and half is in private hands. Such a situation becomes, inevitably, highly political, and only political decisions can solve it one way or the other.

As the SNCF has shown in France, a nation can have a system of the highest technical efficiency which does not, and is not expected, to earn a profit; indeed, it exists on a sizeable deficit met from taxation deliberately accepted as the price of a national service.

A long-term transport policy essential

What we in Britain have characteristically refused to do, so far as our railways are concerned, is to make up our minds which of these two systems we prefer. Mr. Marples came nearest to it in his Transport Act of 1962. Under a Socialist régime it will clearly be more difficult to hold to the principle of "profitability" before "service".

Either system can work, and in this article I am not advocating one or the other. I am drawing attention to the biggest problem of all, which is whether any Government can ever be courageous enough to embrace a transport policy *and stick to it, and any successor of the other side can leave it alone.* Unless this happens, the new BR Study will remain an exercise only, and that will be another tragedy in the long story of political ineptitude for which railway officers and staffs alike have had to suffer, and the nation with them.

Now, at last, we have a truly great conception of public transport before us. Shall we have the courage to back it? I wonder!

LORD HINTON AND THE NEW TRANSPORT ADVISORY COUNCIL

By a correspondent

YET another line of investigation in transport was set up in mid-February when the Minister of Transport, Mr. Tom Fraser, put Lord Hinton (until recently Sir Christopher Hinton and Chairman of the Central Electricity Generating Board) to work in St. Christopher House as a full-time civil servant at a salary of £7,000 a year—and so open to the criticism that his job is worth only seven-twenty-fourths of Dr. Beeching's work. Lord Hinton is charged with the duties of special adviser on transport planning to the Ministry of Transport.

Lord Hinton has until the end of the year to carry out the task. This is six months longer than Dr. Beeching thought he needed, but which the Minister did not think was long enough. Since Dr. Beeching was already apprised of a great deal of the problems involved, Mr. Fraser's defence of the breakdown of negotiations between the Government and the Doctor on this pretext sounds more like a specious excuse than a sound argument.

Particular aspects for study by Lord Hinton and such help as he wishes to call in include: first, the pattern of long-distance transport services likely to be required in the future, with particular reference to the nub of future decision-co-ordination on investment policies for highways and railways; second, methods of achieving a properly co-ordinated use of the main trunk route system and especially the right balance between the use of road and rail—offering a dilemma, presumably, between inducement and coercion; and, third, the age-old problem of improving operational co-ordination between different forms of transport, lack of which on the passenger side aggravates the travelling public and embitters transport public relations. Lord Hinton is free to use all the resources of the Ministry, to seek outside assistance if necessary and, of course, to call on the transport industry for co-operation in reaching his findings.

TAC does not supersede NTAC

Amazingly, Lord Hinton is not the only pebble on the St. Christopher House beach. Never did a Minister have such an appetite for advice. On the same day he appointed a new Transport Advisory Council, which runs parallel with and does not supersede the Marples-appointed and mystical National Transport Advisory Council. The NTAC, of course, is intended to deal with the nationalised boards and the Transport Holding Co. and has only one member common with the TAC—Mr. Ernest Whitaker, an ex-President of the Institute of Transport and transport adviser to Unilever, whose services have been applied before to transport studies, such as the Channel Tunnel and the Rochdale Committee on ports. The TAC has Mr. Tom Fraser for chairman and Lord Hinton as a member. Among the other seven members is Mr. J. E. H. Davies, who is Vice-Chairman and Managing Director of Shell-Mex and BP, and who has also been nominated first director-general of the newly founded Confederation of British Industry; he seems to be getting his time-sheets well filled up before he even starts work. Other members are Professor Alan Day, who deals with economics at the London School of Economics, is an expert on international monetary matters and road traffic engineering, but is alleged to take a jaundiced view of a modern railway's potential; Lord Holford, Professor of Town Planning at University College, London, whose designs for Piccadilly Circus and the surroundings of St. Pauls on Ludgate Hill have evoked some public anguish; Professor E. H. Jackson, director of the Institute of Economics & Statistics at Oxford's University College, who did a stint as deputy director of research and planning for the Economic Council of Europe, 1950–56; Alderman H. Watton, member of Birmingham City Council, chairman of the General Purposes Committee and member of the House Building and Transport Committees; and Mr. W. J. P. Webber, former general secretary of the TSSA and member of the TUC General Council, who turned gamekeeper and joined the National Coal Board in 1963.

Piling Pelion upon Ossa, Mr. Fraser has added Dr. Michael Beesley of the London School of Economics to his staff as a part-timer in transport economics. Perhaps he is to be a counter-blast to Mr. George Brown's ministry, which has its own transport economist adviser; or is he intended to spike the economic big guns of the Treasury?

More reports than action so far

What is all this to achieve? The first objective is obviously to sort some sense out of the masses of available evidence. Mr. Ernest Marples was an inveterate report gatherer. He left his successor with an indigestible meal of the Hall report (on the future of inland traffic), Rochdale (on the ports), Buchanan (on the relation of the motor-car to us all and to city planning in particular) and Beeching parts one and two. Moreover, there will be another soon in the shape of the Geddes, nominally on road vehicle licensing, but bound to delve into policies of road and rail investment. Mr. Fraser seems to feel that not much has been done to turn this pile of paper into tangible results. The TAC is to be set to look for ways of practical implementation of Buchanan (if, first of all, what Buchanan really meant can be unravelled) and the rest of the galaxy of new advice is to be ranged up with some smart answers ready for the emergence of Geddes.

Lord Hinton has been promised an early sight of what Lord Geddes and his colleagues have to say. This will be an advantage, as it was in evidence to Geddes that the British Railways Board, Ministry of Transport and Transport Holding Company clashed over the real costs of lorry traffic on motorways, mainly through working from different premises. The Ministry's new-found advisers must now get to grips with truth, no matter how many entrancing facets it shows, nor how deep are the murky waters which conceal it. When they have found it they are not expected to shout it from the housetops. A whisper to the Minister at one of the monthly TAC meetings will be enough. As Lord Hinton is temporarily a full-time civil servant, he will not make a published report. He will convey his views to the Minister as they are formed—thus incurring two dangers: the need of empirical revision; and the basing of Ministerial action or legislation on a private dossier, with the result that the nation may never know the arguments on which it was founded.

Sir Christopher Hinton, behind a suave and scholarly exterior, was a doughty fighter over atomic energy and electricity supply. Apart from apprenticeship at Swindon and his experience as a user of transport services the field of transport is new to him and he may come forward with some sparkling new thought. In this he starts level with Dr. Beeching in his Stedeford days. At any rate, his thought will be lucid, which makes it the more aggravating if it is not to be placed before the public for discussion.

A co-ordinated sundries service needed

Where can one expect the great co-ordination controversy to affect the railways? First, there may be some further weeding out of unsuitable traffics from the railway and possibly some means of inducing traffics towards the railway. "Directing" traders is never likely to succeed and cuts right across the solemn conventions entered into by Great Britain on freedom of users' choice. But some arrangement is needed that will feed the railway trunk routes, on which haulage can be provided so cheaply, at city terminals by road vehicles without restriction on ownership. This is more an exercise in union negotiation than on co-ordination, and now seems as far from resolution as ever. But only this will open up fresh vistas of Liner trains, roadrailers, piggybacks, container services and other developments that railway operators and commercial people ought to be thinking about. The sundries side, as Dr. Beeching pointed out in his recent *Observer* interviews, demands rationalisation on a national scale. At present there are several distinct parcels services working unremuneratively alongside one another. How far can railway sundries, passenger train parcels, post office parcels and BRS smalls traffic be amalgamated to provide a vastly superior, less costly and more profitable service? Where could the great haulage firms engaged in parcels, such as Atlas Express, come into such a national effort? This might well be a subject for Lord Hinton.

Is passenger service co-ordination practicable?

On the passenger side the problem is both simpler and more complex—simpler because road undertakings work in harmony rather than rivalry, even if they are sometimes mutually indifferent to the passengers' detriment, and because, in my view, co-ordination has been practised energetically since 1930; and more complex because the problems which remain are the intractable ones, which after detailed technical papers breed long discussions on "limiting factors in road and rail co-ordination". They arise, bluntly, from passenger impatience. If one service or another is late, who is to wait to make the connection? At any given point, are more than 3 per cent of the passengers potential changers from one to the other? Granted there are difficulties of this sort, what can be done to organise better interchanges physically and better through connections assured by the timetable and clinched by issue of a through ticket?

Besides all this the conurbation problem—understood to be a province of TAC rather than Lord Hinton alone—looms large and will apparently be the first concern. It concerns the need for the railway to help the buses at the peak hours and to be sustained out of the bus revenues at other times. This was solved long ago in London by the Common Fund Act of 1915, but is not susceptible of easy solutions in the provinces, where local studies are now under way in eight conurbations. The grave danger in a time of falling traffic is that a pool of receipts in the city may rob country services of their cushioning and bring about disruption unjustified by the meagre urban benefits that can be expected. In the meantime urban railways either moulder away or make unpleasant showing in the BRB accounts.

From stationmasters to station managers on BR

ABOLITION of the District as a link in the chain of responsibility between BR Regional headquarters and the lowest traffic management unit—station, goods depot, marshalling yard or motive power depot—has made a large number of heads of local management units, such as stationmasters, goods agents and yardmasters, responsible direct to the Divisional Manager. Consequently there has arisen a danger of excessive reference to Division of minor matters, which used not to go further than District HQ. A few District HQ remain in some Regions, incidentally, as outposts of Divisional HQ; their *raisons d'être* are geographical remoteness from Divisional HQ, some special complexity or density of traffic, or an unusual volume of commercial activity in the area.

There is now a need to reduce the large number of heads of local management units (or "local managers", as one Region would like to call them) who report to a Divisional Manager. That is one reason for action by four Regions, the London Midland, Western, Southern and North Eastern, to alter their traffic organisations according to their own ideas and requirements. The BRB has given the Regions a free hand in this, though clearly approving of the underlying principle. Other reasons are the complexity of present commercial and operating factors and the consequent need to combine responsibility for traffic functions at the lowest possible level, without sacrificing economy from the staff and establishment viewpoint, also the desirability of encouraging heads of local management units to think of themselves—and to be thought of—as managers.

Station Managers in the LMR and WR, Area Managers in the SR, and Section Managers in the NER are the result. But, because of the need to observe the staff consultation procedure, largely to ensure that every implication with regard to transfers and promotions has been studied and agreed, progress has been slow in all four Regions. The WR so far has appointed two Station Managers, to Paddington and Reading. NER Section Managers form an intermediate layer between Divisional HQ and local management units.

The terms of appointment of new Station Managers at Euston (Mr. E. A. Drinan) and St. Pancras (Mr. E. W. Savory) illustrate the LMR's concept of the most senior Station Managers' responsibilities, which are almost equal to those of former District Superintendents of compact territories. On the LMR, Station Managers replace stationmasters. Each reports direct to his Divisional Manager. He is responsible for a group of local management units, but not necessarily for all traffic activities. Thus the Station Manager at St. Pancras has no freight depot responsibilities, though he is in charge of freight train operation in his area. Many LMR Station Managers have no marshalling yards, m.p.d.s. or carriage sidings under their control.

The dozen or so LMR Station Manager appointments already made—and not confined to any one Division—include, besides the two London termini, Aylesbury, Burton-on-Trent, Chester, Corby, Leek, St. Annes, Stone, Uttoxeter, Watford and Whitchurch. This list illustrates the very varying nature of Station Managers' responsibilities. By the end of this year the LMR Western Lines' London (Western) Division will have 24 Station Managers reporting to the Divisional Manager instead of 88 stationmasters, goods agents and the like.

At Euston, when, after completion of staff consultation procedure, Mr. Drinan assumes command of a staff totalling 1,600, he will be in charge of the whole passenger terminus including parcels traffic and of operation of the main line as far as Camden, including the carriage sheds and sidings and the e.m.u. stabling depot at Camden that is due to come into operation next year.

At St. Pancras Mr. Savory has under his management the passenger terminus and the main line as far as Belsize Tunnel, Kentish Town and Upper Holloway (Tottenham & Hampstead Joint) stations, Kentish Town carriage cleaning and maintenance depot, and the depot at Cambridge Street for routine servicing of diesel main-line locomotives. Whilst he will be responsible for the operation of all traffic including freight trains in his area, he will not be responsible for working and commercial activities within Somers Town or any other freight depot.

The German Federal's traction plan: the first ten years

Since 1954, the German Federal's gross ton-mileage has increased by 34 per cent. The most intensive traffic over many routes has made dieselisation and electrification essential operationally, quite apart from economic considerations. This has been carried out successfully by a steady development of clearly-defined design principles

Part 1

FOR a dozen years now a steady change in the methods of railway operation has been evolving in Western Germany. It is based principally upon the new forms of motive power, but also on advanced signalling and telecommunications practice. As early as 1952 a decision was made to replace the steam locomotive entirely by diesel and electric traction. At that time no fixed final date was visualised, but this soon came to be accepted as 1970–72. In 1952, also, there was no clear idea as to just how far electrification might be carried, although a total of 5,000 route-km (3,125 miles), including the then existing distance of around 1,750 km (1,095 miles), was contemplated. However, as with all electrification schemes, this total has been extended from time to time and the contemplated total is now around 8,500 km (5,310 miles).

The ideas behind these major conversion schemes were, in the beginning, entirely economic, based on estimated financial savings. In the event they have come to be dependent also on other factors, of which the two main ones are: the increasing difficulty of getting a regular inflow of keen and promising recruits for all grades; and the necessity of working substantially increased traffics over certain routes without increasing the number of tracks. This second aspect became vital some years ago through such bottlenecks as the Rhine route between Cologne and the Bingerbrücke–Mainz–Wiesbaden area.

In greatly condensed form, Fig. 1 shows what has happened on the German Federal Railway (DB) system since 1954, during which time the system length has remained fairly steady at 30,000/30,500 km (18,500/18,800 miles) of route. During this decade, the gross ton-miles handled have increased by about 34 per cent and the motive-power km by 5 per cent, while the total number of motive-power units, excluding the so-called *kleinlokomotiven*, has decreased by about 8 per cent. These differences in traffic and motive power are not so great as on some railways, but this is due partly to the dense and complicated system of lines, and partly to the wide use of diesel railbuses, to a total of over 900, in place of locomotive-hauled trains. Nevertheless, gross ton-miles handled per unit have increased by 45 per cent and average mileage per unit by 13 per cent.

Decrease in motive power

The number of steam locomotives, also, has not decreased so much as might be expected from a consideration of the big growth of electrification and the large number of diesel units in service. This is due in part to the fact that many of the diesel units are used only in lightly-loaded passenger services or in shunting, so that diesel traction plays only a small part in train haulage on the basis of ton-miles, although the main-line diesel locomotives handle some heavy and important trains.

This can be seen from the three graphs in Fig. 1, wherein diesels are shown to be responsible for only some 9.5 per cent of the gross ton-miles, though for about 28 per cent of the motive-power mileage. They form about 26 per cent in number of all motive power units. But of the diesel total (excluding *kleinlokomotiven*) 32 per cent of the units are of 300 b.h.p. or less (railbuses), and another 35 per cent are shunting locomotives of 650 and 360 b.h.p.

Steam power cut by 45 per cent

Steam locomotive stock has been reduced by 45 per cent, and just over 5,000 units were still held serviceable at the end of 1964. But whereas in 1954 steam locomotives formed 86 per cent of all motive power units and handled 86 per cent of all gross ton-miles, today they represent about 48 per cent of the total stock and in 1964 handled around 44.5 per cent of the gross ton-miles (though at the end of the year the value was 41 per cent), even though electrification has taken the cream of the fast and heavy traffic away from both steam and diesel locomotives. This is because certain heavily industrialised

Continued on page 204

Above left: The German Federal will this summer be running passenger-carrying trains at 125 m.p.h. between Augsburg and Munich with one of its new Class E03 locomotives (*see page* 214); this picture was taken during last year's trials between Forchheim and Bamberg.
Below left: The southbound "Rheingold" threads the Rhine Valley near St. Goar behind a Class E10.12 Bo-Bo electric locomotive on August 20, 1964. *Photo by B. Stephenson*

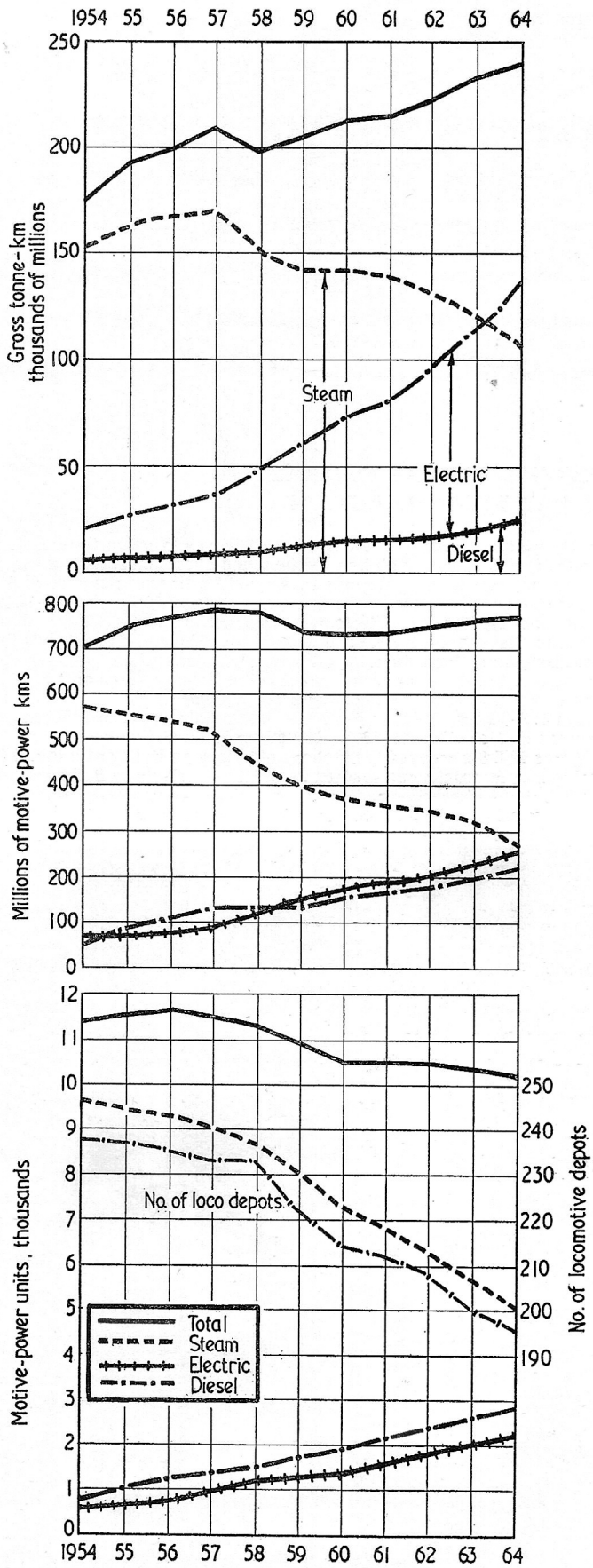
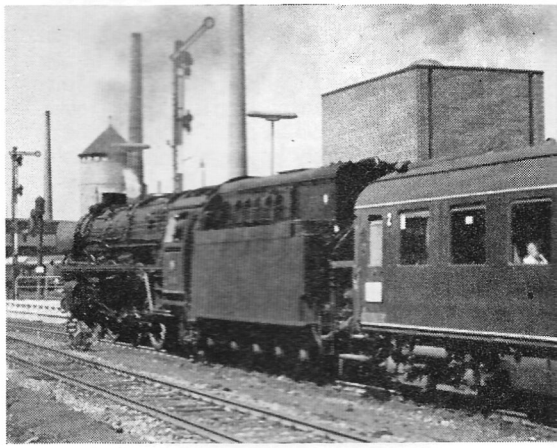


Fig. 1. German Federal motive power (locomotives, railcars, railbuses and electric motor-coaches) 1954–64 in relation to traffic and mileage.



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SURVIVING GERMAN FEDERAL RAILWAY STEAM TRACTION

1 Three-cylinder Class 44 2-10-0 No. 44.1529 leaves Western Germany's longest tunnel, the Cochemer, between Cochem and Eller (Mosel) with a heavy train of coal hoppers for Luxembourg on August 21, 1964. *Photo by B. Stephenson*
2 Class 03 4-6-2 No. 03.244 leaves Cochem with the 7.02 Saarbrücken–Koblenz on August 22, 1964. *Photo by B. Stephenson*
3 Oil-fired Class 01 4-6-2 No. 01.10 restarts the "Holland–Scandinavia Express" from Bremen in June, 1964. *Photo by R. Martens*
4 Two Class 82 0-10-0Ts photographed in the Hamburg area on September 26, 1964. *Photo by W. G. Sumner*
5 Class 01 4-6-2 No. 01.177 at Karlsruhe with a Salzburg–Saarbrücken express on November 10, 1963. *Photo by W. G. Sumner*
6 A Class 23 2-6-2 crosses the Moselle after leaving Bullay with the 16.15 Cologne–Saarbrücken on August 21, 1964. *Photo by B. Stephenson*

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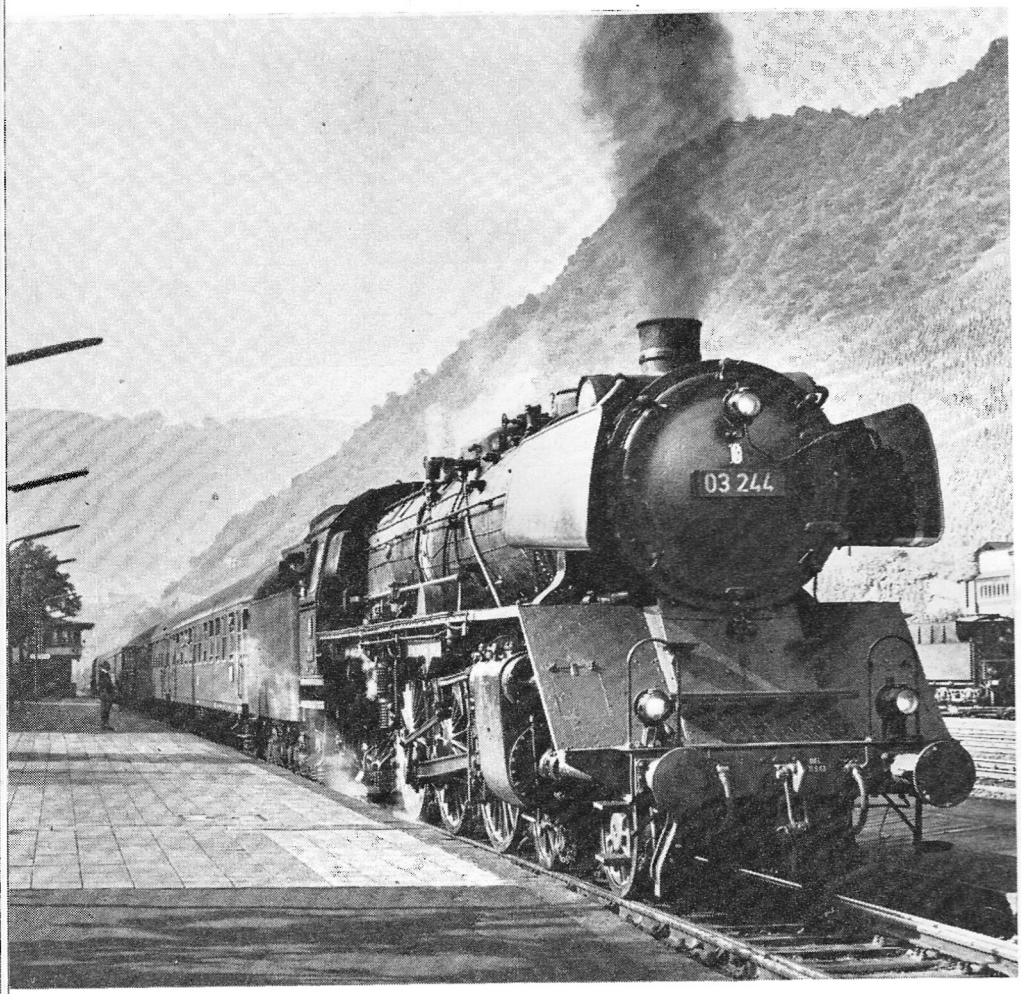

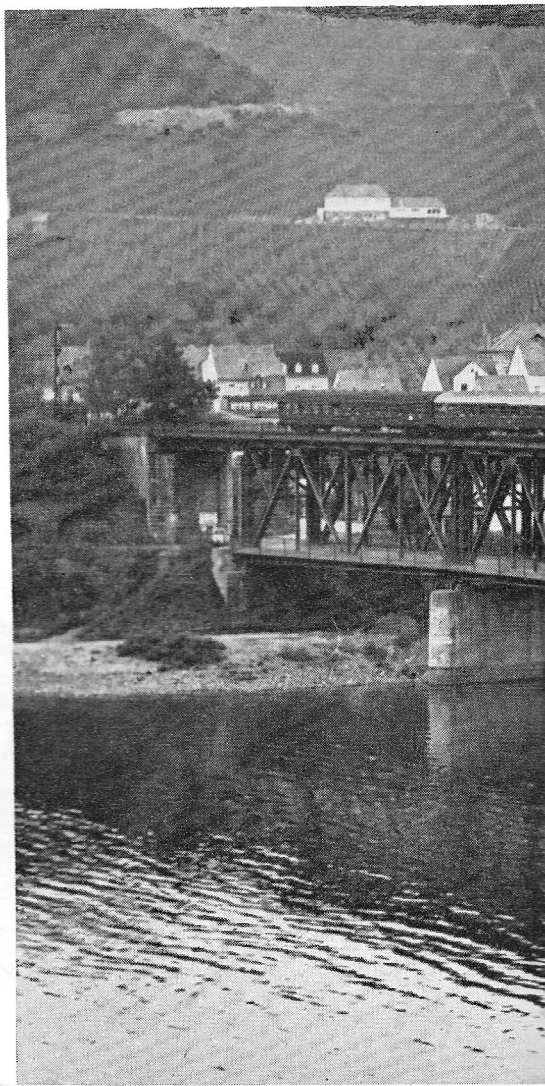

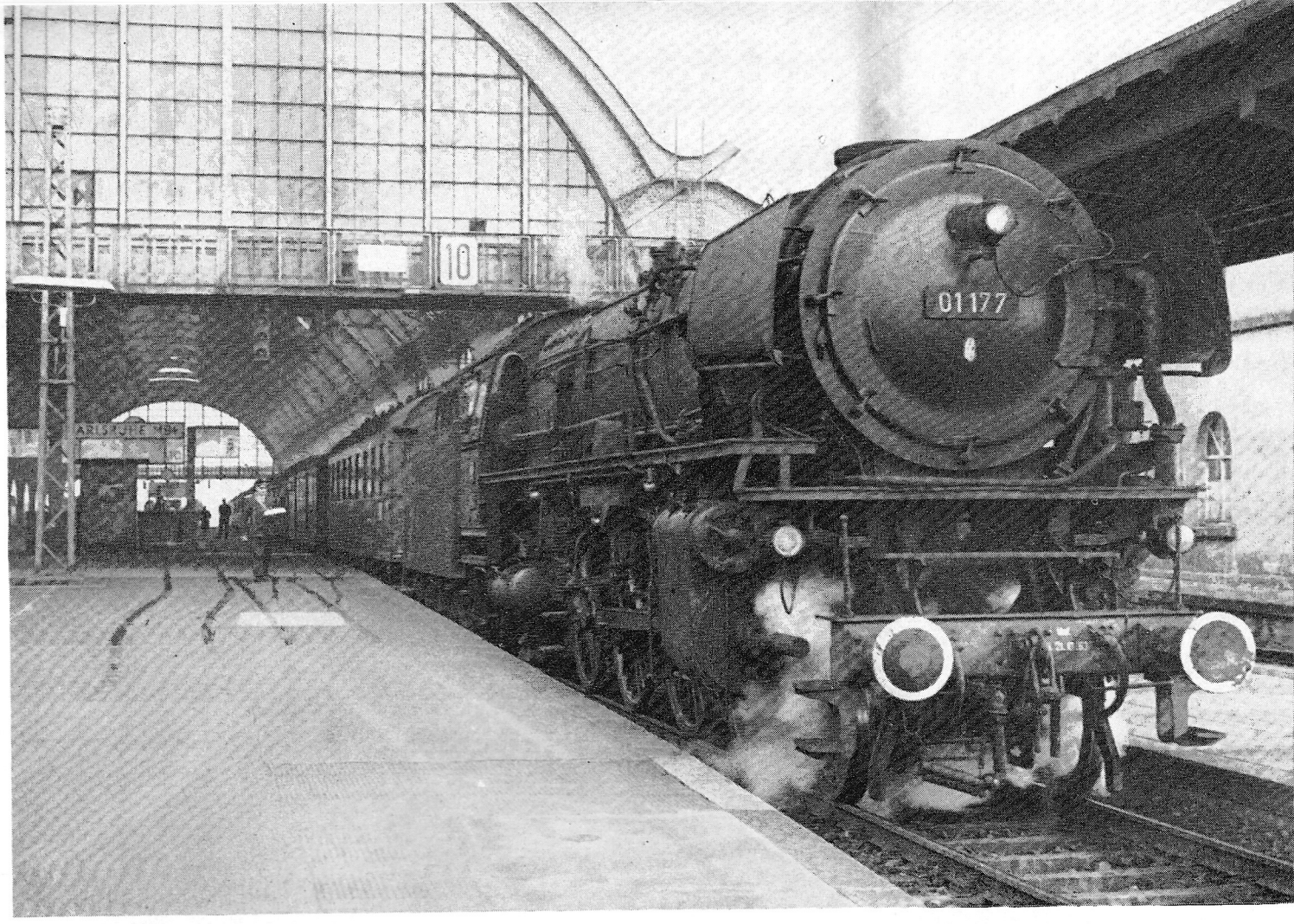
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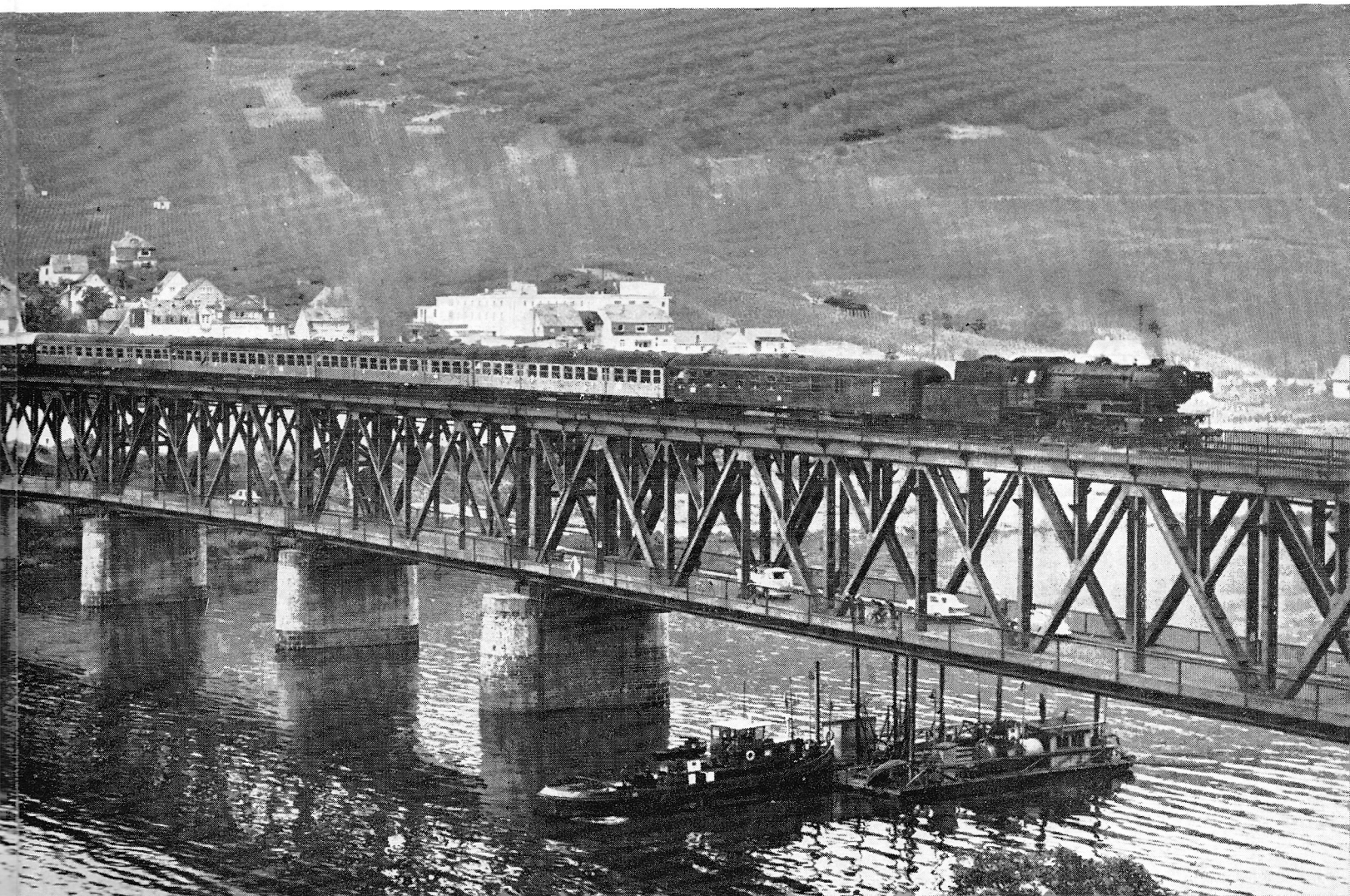
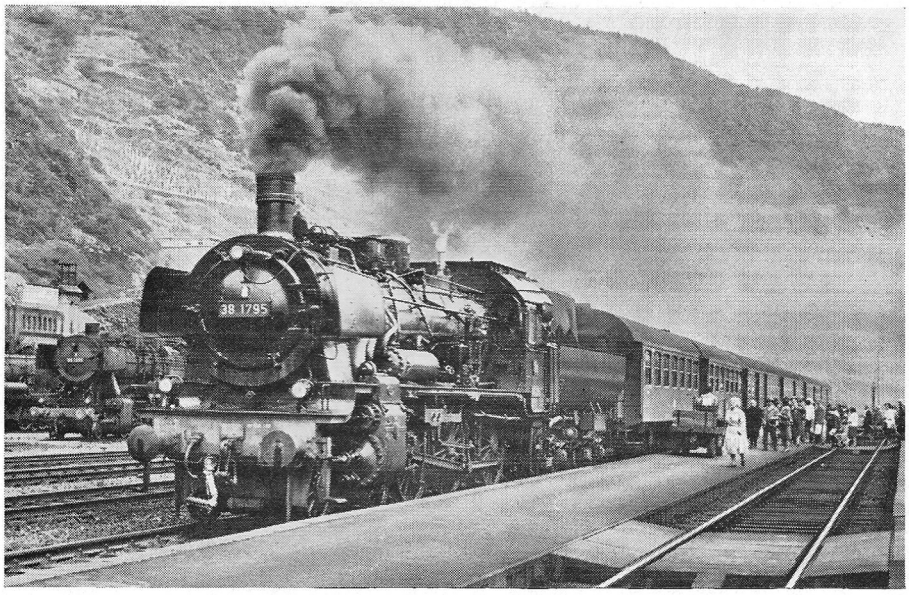




Class 38 (former Prussian P8) 4-6-0 No. 38.1795 at Cochem with the 10.09 Koblenz–Trier on August 21, 1964. *Photo by B. Stephenson*

regions still retain numerous steam locomotives. The Essen Direktion, for example, still makes 46 per cent of its total motive-power miles with steam, and the Saarbrücken Direktion 56 per cent.

On the other hand, electric locomotives and motor coaches, which in 1954 formed under 7 per cent of the total stock and handled 14 per cent of the gross ton-miles, today represent just over 20 per cent of the total and in 1964 handled 46 per cent of the gross ton-miles. The proportions of ton-miles to motive-power units is even better if electric locomotives alone are concerned. However, to fill in lie-by times, electric locomotives of 4,000 h.p. and over are often engaged—though not for big mileages—on passenger trains equivalent to no more than three of the DB's 86ft bogie coaches.

The rate of reduction of steam locomotives and the rate of increase in diesel and electric stock is shown also in Fig. 2, which gives the percentages of all three types in relation to total motive power. Some effects of the changes are seen also in the bottom graph in Fig. 1, which shows a decline in locomotive depots (*bahnbetriebeswerke*) from 238 to 196. Of the 196 depots today, 63 are still for steam locomotives only, 23 are for diesels only, and two (both in the Frankfurt Direktion) are for electric locomotives only. All the others are mixed depots and 16 of them cater for all three types of motive power. Another change is in the number of footplate personnel: in 1958 the total was 53,600; today it is 42,600, Figs. 3 and 4 give the motive-power distances and traffic performances as percentages of the whole.

Under the present programme and projects steam will have more or less disappeared from the DB by 1970–72, and by that time something between 8,500 and 8,800 km (5,310–5,500 miles), will have been converted to single-phase 15-kV $16\frac{2}{3}$-cycles electric traction. Unless major closures under the new Oeftering proposals are made within the next few years, the DB system in 1970 will amount to just under 30,000 route km (18,750 miles). Of this total 30 per cent will be then electrified, and will carry practically 70 per cent of the gross ton-miles; the other 70 per cent will be operated by diesel traction but will handle only 30 per cent of the gross ton-miles.

Steam kept in first-class order

A few years after the war the steam locomotive stock of the then newly constituted Deutsche Bundesbahn totalled about 12,600, much of it in bad repair. It was made up of over 100

Fig. 2. Division of DB motive power units by number and proportion.

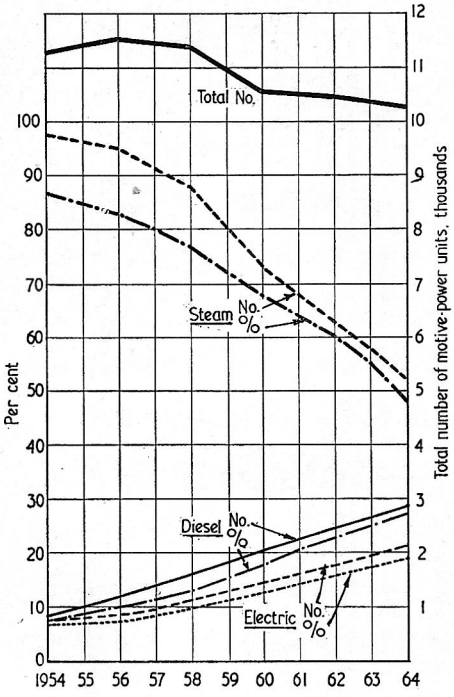


Fig. 3. Motive power distances as proportions of the whole; the electric percentage is the balance between the steam and diesel aggregates and the whole.

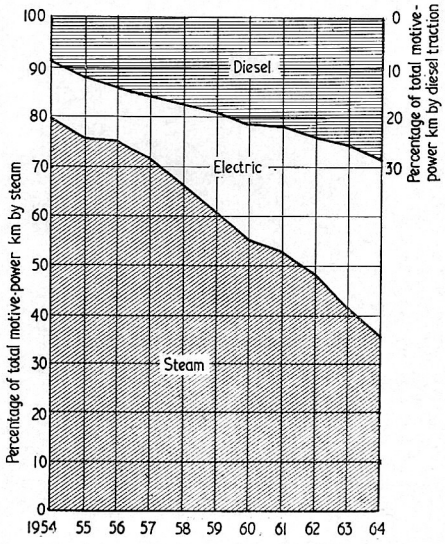
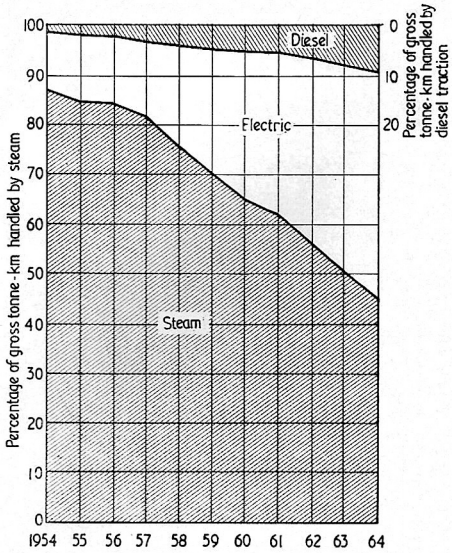


Fig. 4. Motive power performances as proportions of total gross tonne-km; electric traction performance is the balance between the steam and diesel aggregate and the whole.



different classes. By 1954 the total had shrunk to 9,675, grouped in 65 classes. Today the number is just 5,000 and in the middle of 1964 was constituted of 24 classes.

Of these, the only post-war designs, apart from the two Pacifics of Class 10, are the Class 23 2-6-2, the Class 65 2-8-4T and the Class 82 0-10-0T, all built-up on bar frames and with all-welded boilers. But these form only a small proportion of the whole. The most numerous classes today are the several variations of two-cylinder 4-6-0 grouped into Class P38, and the wartime German semi-austerity 2-10-0 of Class 50. The "full-austerity" Class 52 2-10-0 has long since disappeared, except for one or two "stationary" examples, one of which, with condensing tender, still functions at Rosenheim. With the 1964 electrification of the so-called Nord-Sud line (Hanover to Frankfurt and Gemünden) the magnificent three-cylinder simple 2-10-0s of Class 44 have largely disappeared, though some have been transferred to the flat lands further north.

The all-welded boiler, so successfully used, was a wartime development, and apart from the three classes noted above, built in 1950–53 (Class 23 up to 1958), the only major steam locomotive development has been the application of oil firing to a considerable number of the Class 01 two-cylinder simple 4-6-2s. But with the rapidly decreasing number of steam locomotives there is one outstanding difference between practice in Germany and that in a similar situation on British Railways—all German steam locomotives continue to be maintained in first-class mechanical order.

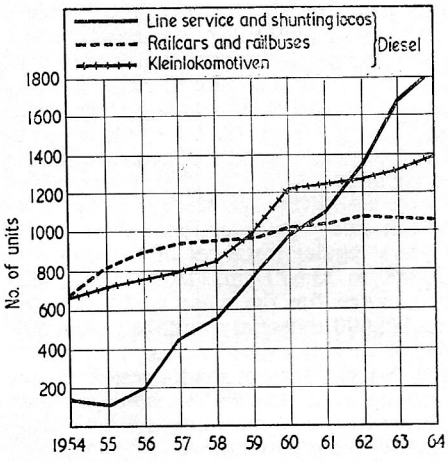
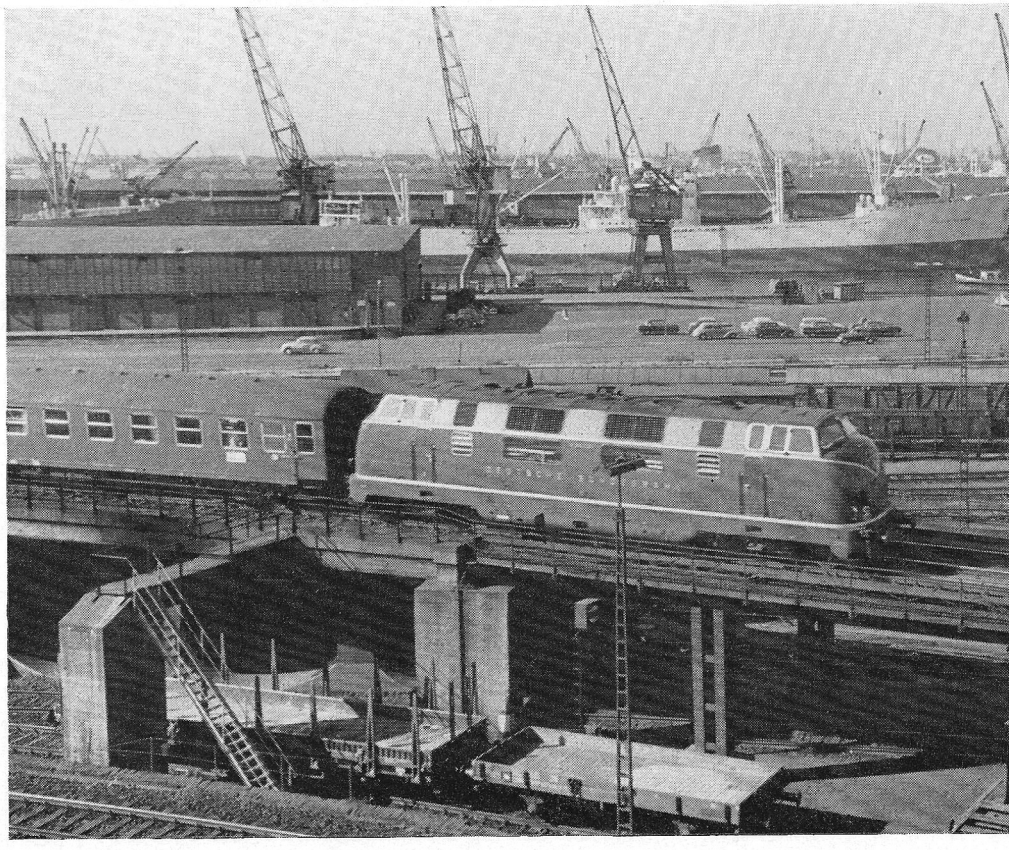


Fig. 5. The increase in German Federal diesel power, 1954–64.



A Class V200 diesel-hydraulic in the Hamburg Docks area at the approaches to Hamburg Hbf.

Though opportunities to make long through runs are rare, some of the oil-burning 01 Pacifics run up to 22,500 km (14,200 miles) a month. These particular locomotives have for long been operated in the Kassel Direktion, but with the electrification of the Nord–Sud and Kassel–Eichenberg lines in 1964, some have been transferred north, as have some of the Class 44 2-10-0s, which for years maintained the heaviest freight traffic over the 1 in 80 to 1 in 100 ruling gradients of the Nord–Sud line. The Pacifics still continue to operate the Kassel–Giessen–Frankfurt services.

Diesel policy unchanged since 1950

It is unusual, if not unique, to find any large railway which has followed unbrokenly for a decade or more a single original conception for its diesel motive power; but this is found on the DB for line-service locomotives. The basic conception for line-service diesel locomotives adopted in 1950 was to incorporate in all such units the fundamental desideratum for all transport machines, namely a high power/weight ratio, by applying the phenomenal technical advances made through the years 1939–46, and to develop consistently such principles until the needed high degree of reliability was attained.

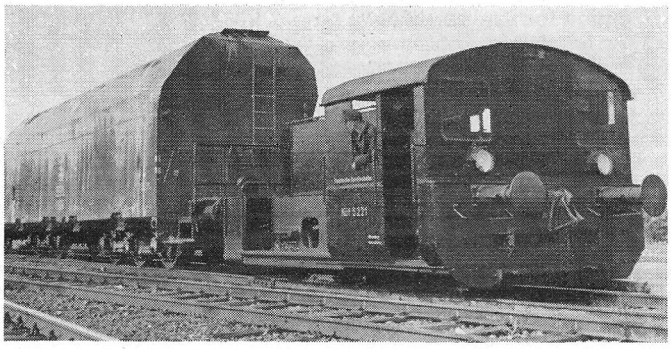
The guinea-pigs were the 10 single-engined Class V80 B-B locomotives of 1950/51. Like all succeeding classes they had quick-running lightweight engines, hydraulic transmission, full cardan-shaft drive, lightweight welded chassis and superstructure. Their bogies were of ideal-pivot type with few wearing surfaces, and those limited to the points of tractive effort and braking transmission between bogie and body.

Then followed the first of the 2,200 b.h.p. Class V200, extended to a total of 86 machines by 1959, with all-on weights varying from 73 to 80 tons according to make of engine and transmission installed. These were general-purpose machines, although used mainly on express passenger work. In 1962–63 the design was developed into the V200[1] series, of which 20 are running and another 30 in course of delivery. Here an output of 2,700 b.h.p. is obtained on four axles and a weight of 80 tons.

In 1960–61 two further line-service classes were introduced in prototype batches. Development of engine and transmission technique had advanced so that up to 2,000 b.h.p. could be obtained fron one engine and transmitted through one set of hydraulic transmission. So the Class V160 B-B was developed, on a weight of 72 tons, and with its single engine set to 1,900 b.h.p. The 10 prototypes ran for nearly four years, before, recently, a production order of 50 was passed.

Also, in 1960 came the first of a new single-engine B-B of 1,100 b.h.p. and 63 tons weight. It was intended for the numerous secondary and cross-country lines over which phenomenal mileages could never be made, and over which all types of freight and passenger traffic would have to be handled by one type of locomotive. After the prototype batches, several large orders have been placed. Today, including the units still under construction, there are well over 700 of these Class V100 locomotives; but the last 350 or so are of 1,350 b.h.p. on the same weight.

A feature of all this DB practice is that over a range in



A German Federal Kleinlokomotiv of Power Group II marshals bogie cement wagons.

axleload from 16 to 20.3 tons all locomotives from 1,100 to 2,700 b.h.p. are B-Bs; that is, they have only four axles, all driven. The only diesels with six axles are the 3,000 b.h.p. C-C of 101 tons weight built by Krauss-Maffei, and the V320 locomotive of 4,000 b.h.p. on 124 tons weight built by Henschel.

Over 900 V60s in service

The DB standard shunter, the V60, was evolved in 1953/54 and has been built almost continuously ever since, to a total now exceeding 900 machines in service. This was the locomotive which really introduced the quick-running oil engine to shunting locomotives. Its other feature, side-rod drive to the wheels, is obsolete in present-day construction, but has been retained right through for purposes of standardisation. Many of these locomotives, at 48 tons weight, are a bit light on their feet for shunters, but a number are ballasted up to 54/56 tons.

In 1951/52 came the VT08 high-speed trains of 1,000 b.h.p. with three and four cars; and a little later the VT12 trains, similar, but with seating arranged for shorter-distance travel. Finally, in this class, came in 1957 the TEE trains, of seven cars including two power cars and aggregating 2,200 b.h.p. of traction power. But compared with their effect on DB economy, all of these, though achieving limelight and prestige, have to take second place to the two-axle railbuses, of which there are now over 900, and which operate all kinds of branch-line, secondary-line and even short-distance interurban traffics, often with formations of two or three railbuses and two or three trailers driven by one man.

Mention must also be made of the *kleinlokomotiven*, though in the various statistics in this article they are included only in fig. 5, which shows the growth of the three major types of diesel power. These are two-axle shunting tractors arranged in three power groups: I of 50 b.h.p.; II of 107 to 128 b.h.p.; and III of 225 b.h.p. Group I is formed entirely of pre-war stock; Group II, with the order placed in 1964, is now complete; Group III is to be extended to an eventual total of around 300 from the present 183. The current total of all three groups is 1,400.

At the end of 1964 the total diesel stock of all forms on the DB was 4,250. Of these, 1,820 were locomotives, 1,030 were railcars and railbuses, and the remainder *kleinlokomotiven*. Standardisation has been thorough, because of the 1,820 locomotives over 900 were of the V60 class, 745 of the V100 class, and 86 of the V200 type. Of the 1,030 railcars and railbuses, 577 were single-engine 150 b.h.p. railbuses and 330 were double-engine 300 b.h.p. railbuses. A new standard heavy shunter, the Class V90 B-B of 1,100 b.h.p., has just been introduced with a prototype batch.

Standardisation of components is practised on the principle that two or three engine makes and two transmission makes shall be interchangeable, so that in practice one can find a V200 locomotive with a Maybach engine at one end and a Daimler engine at the other, one driving through a Mekydro transmission and the other through a Voith; but a month or two later quite a different combination may be found in the same locomotive. Only the V60 has one engine and one transmission throughout.

No great efforts have yet been made to turn over complete districts to 100 per cent diesel traction, although the Schwarzwald secondary main-line for the last three years or so has been operated entirely by V200 locomotives. Today something like 2,400 route km (1,500 miles) have all passenger services worked by diesel power and 576 of these have also all freight trains operated by diesel locomotives or *kleinlokomotiven*, for some of the latter are fitted with air brakes and are permitted to haul local goods trains.

25,000 miles a month by d.m.u.

Unfortunately many of the statistics for diesel locomotive operation (such as those given by Mr. F. W. Felgner, chief officer for locomotive running of the DB, in *Die Bundesbahn*, December 1964) combine those of line-service locomotives with those of shunters, so that no true picture of either can be obtained. But from other sources particulars of the performance of the 86 locomotives of Class V200 are available, and so give some idea of main-line locomotive results. These are summarised in Table I. From this it will be seen that a maximum individual monthly mileage of 37,000 km (23,000 miles) has been obtained; but though this was exceptional there have been for two or three years regular instances of locomotives of this type covering 30,000 to 33,500 km. (18,600 to 20,800 miles), and the steady average for the class is 220,000 to 230,000 km. (136,500 to 145,000 miles) a year taken over the whole fleet of 86. Some of the high-speed railcar trains still exceed these figures, even though many of the longest-distance services having been turned over to electric haulage; the VT12 trains based on Frankfurt, and including a Frankfurt–Paris return trip in a four-day roster, are known to run 40,000/41,000 km (25,000 miles) in a 31-day month.

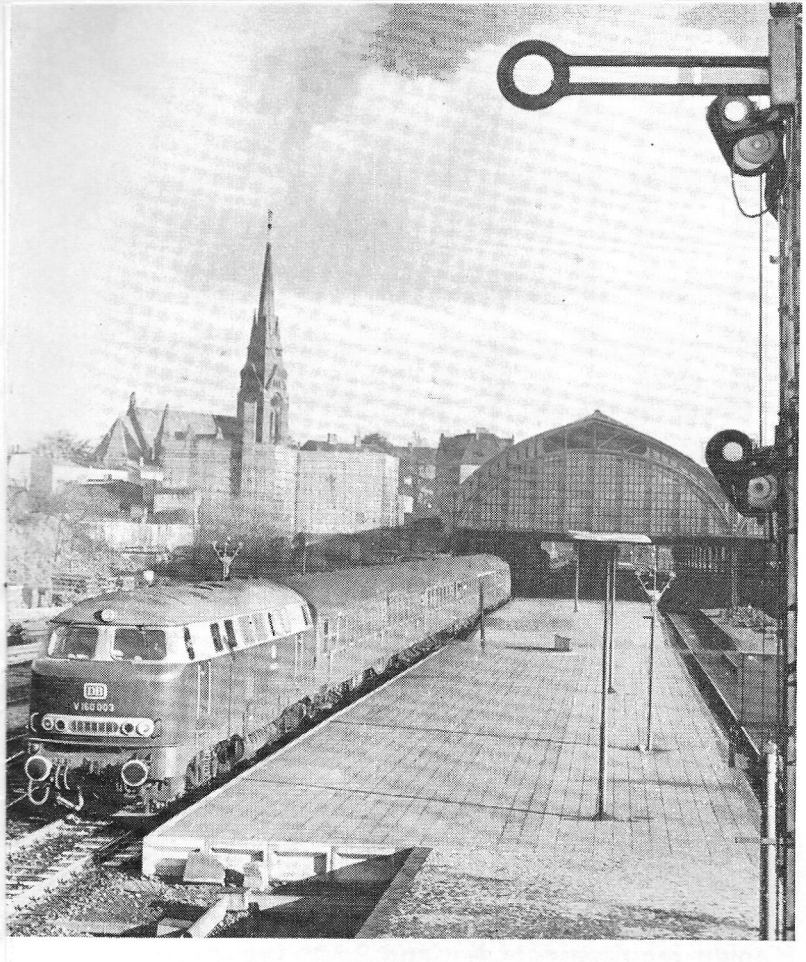
Over the last five years the availability of the 86 Class V200 locomotives has been 90 per cent and the annual mileage of the fleet 19m to 20m miles. With increasing electrification it is becoming difficult to schedule these units for more than 20m km a year total, which means around 18m km actual running. On the other hand, as indicated in Table I, the average train weight tends to increase.

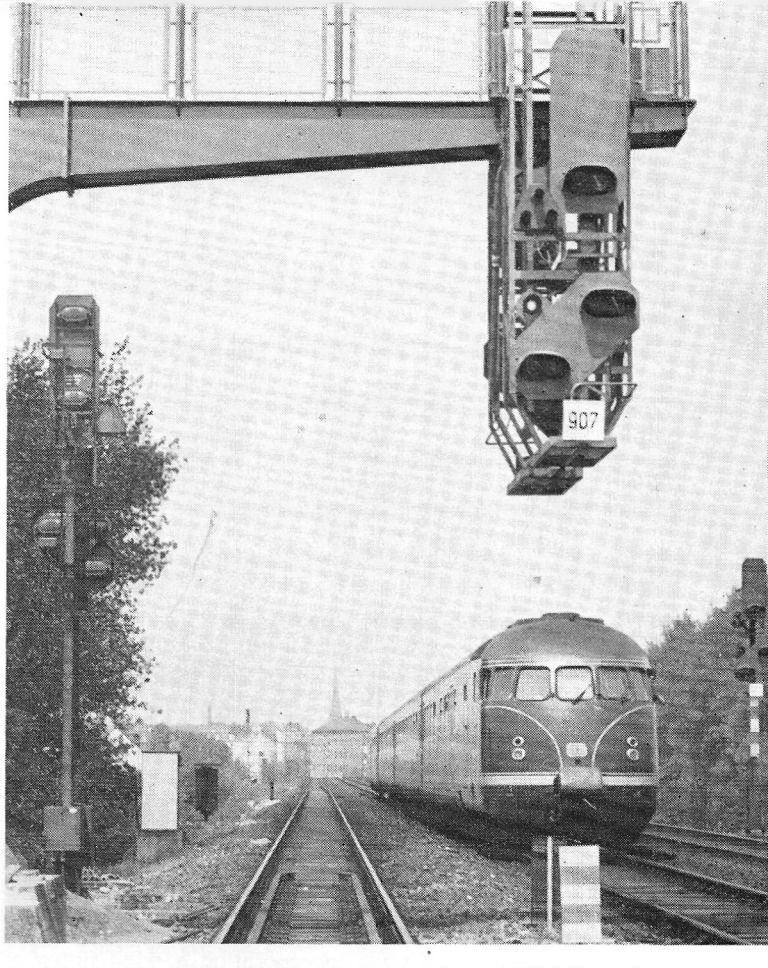
The Class V100 locomotives make nothing like this mileage and it was never supposed that they would. The *raison d'etre* was a diesel locomotive of reasonably low capital cost and low running charges, but two of whose main advantages compared with steam would be lower axleload and practically no stand-by charges. Taken over the first 500 or so locomotives of this class the average distance is only 75,000 to 80,000 km (46,000 to 50,000 miles) a year, which mileage covers all the duties that can be scheduled on secondary routes. According to Mr. H. Rath, who is intimately connected with these locomotives, with this mileage and a life of around 30 years the interest and depreciation charges per mile are 25 per cent of the total working cost, whereas with the V200 class making 230,000 km a year the capital charges per mile are only 11 per cent of the total working cost.

To be concluded

Table I—PERFORMANCE OF DB CLASS V200 2,200 b.h.p. DIESEL LOCOMOTIVES.

Year	No. of locos at end of year	Average monthly distance per loco, km.	Max. monthly distance for one loco, km.	Aggregate annual distance of class, km.	Average trailing train weight, tonnes	Average fuel consumption, litres per km.
1955	5	20,000	—	1,000,000	270	2.37
1956	20	15,000	—	1,200,000	260	2.37
1957	53	17,250	—	8,500,000	268	2.26
1958	55	18,400	24,000	12,100,000	278	2.37
1959	80	18,600	27,000	16,000,000	305	2.57
1960	86	19,400	31,000	20,000,000	330	2.76
1961	86	18,400	33,000	19,000,000	333	2.79
1962	86	19,350	37,000	20,000,000	340	2.85
1963	86	20,400	35,000	20,100,000	345	2.88





GERMAN FEDERAL DIESEL TRACTION

Above left: A 1,900 h.p. Type V160 locomotive leaves Lübeck Hbf for Hamburg with a push-pull train of modern 86½ft bogie stock.
Above right: A four-car Type VT08 high-speed train for long-distance service.
Centre right: Fuelling one of the 900 standard Type V60 0-6-0 shunters of the German Federal Railway.
Below: A 1,100 h.p. Type V100 locomotive heads a train from Kempten to Lindau near Immenstadt.

BR must pursue a continuous traction development policy

The disadvantages stemming from the present multiplicity of BR diesel locomotive types have helped to prejudice management against expenditure on new prototypes. But to delay initial work on the next generation of traction any longer is to court a repetition of these difficulties in a year or two's time. A special correspondent outlines the powerful case for action now

THE few forward-thinking engineers left to deal with the planning, design and development of British Railways locomotives are likely to have their work brought to a halt within a very short time. The reasons, which are not of their making, are not far to seek.

At the end of the last war BR lost valuable time by developing and adding steam locomotive types to an already vast variety. The five years or so spent in this way were followed by a sudden scramble for diesel locomotive types ranging from 800 to 2,750 h.p. Elsewhere, railway administrations carefully developed one, possibly two designs at a time, and began a production run only after a careful service evaluation of five to ten prototype locomotives. The unprepared engineering staff of BR, on the other hand, were required to sponsor and operate a welter of designs incorporating a wide range of engines, transmissions, running gears and auxiliaries, some of which were evolved in this country and others taken over from abroad on the basis of licence agreements. It did not require much imagination to foresee the outcome of this over-hurried policy of trying to run—and run fast—before anyone had even realised what was involved in standing on their own feet.

An understanding of the finer points of diesel engine design and maintenance is not acquired by studying makers' instruction books. These are good so far as they go, but they do not provide—nor are they intended to—the sixth sense that comes only with experience. It would have been wiser, therefore, to have introduced diesel traction with a few carefully chosen and proved power plants, rather than to swamp the maintenance and overhaul personnel with a wide number of makes and types. The variety of equipment was bound to result in the ensuing variety of difficulties, so far as operational reliability and maintenance requirements were concerned.

Considered in isolation, each of these difficulties can readily be mastered. It becomes a daunting overall problem because within a multiplicity of locomotive types there is such a range of problems, affecting running gear components, cylinder liners, crankshafts, crankcases, transmission shafts, gears and bearings—not to mention train-heating boilers.

Present fleet must be simplified

After this experience, understandably, top management and the operating departments tend to shudder at talk on further evolution of the main-line diesel fleet. Evolution means not only cleaning up and rationalising the existing fleet, but ultimately the introduction of improved designs. The frightening prospect of yet more types is likely to be resisted for three reasons.

First, it will be said that there are enough difficulties with the existing varieties; these will only be increased by introducing fresh designs. Second, large-scale locomotive acquisitions are over and done with; no more sizeable orders are likely to be required for some time. Third, the prevailing nominal maximum output of 2,750 h.p. is all that is ever likely to be required.

While, admittedly, most of the current disappointments are largely due to the great variety of locomotive types, it does not follow that the introduction of further designs is bound to complicate the situation. On the contrary these designs should benefit from previous experience and thus ensure improved all-round performance, enhanced by improved reliability and accessibility. In fact this, together with the consequent ultimate reduction of types, should adequately justify undertaking the work.

Although the immediate locomotive demands of BR are now almost met, the weeding out of some of the numerous designs will lead to greater reliability and rationalisation, as well as reduced maintenance demands. But this reduction of the fleet, together with the wear and obsolescence induced by increasingly arduous locomotive duties in terms of loads and daily mileage, will call for a growing number of new locomotives as time goes on. Many existing locomotives will have to be relegated to secondary duties, as the increasing loads and speeds of the main-line services will in turn call for more powerful and faster locomotives.

Known requirements demand 3,500 h.p.-plus

This brings us to the third objection, based on the view that a 120-ton 2,750 h.p. unit is all that is ever likely to be required. As long as speeds on the level and in still air are not to exceed 90 m.p.h. with 435-ton passenger trains and as long as freight train wagons incorporating modern suspension are to be limited to 750 tons at 75 m.p.h., 2,750 h.p. should suffice. But at 100 m.p.h. and with a 10 m.p.h. headwind, which should be allowed for in normal operation, the trailing weight will have to be limited to 230 tons as compared with 300 tons at 100 m.p.h. in still air. Similarly, the trailing weight of a freight train facing a headwind of 10 m.p.h. at a forward speed of 75 m.p.h. will have to be limited to about 610 tons. These values suggest that the future operating requirements of truly progressive operators are unlikely to be met by 2,750 h.p. and that locomotive outputs of 3,500 to 4000 h.p. will be required for both freight and passenger trains.

Current trends in operating thought, which in some cases contemplate trains of as much as 4,000 tons weight in the future, justify consideration of four basic locomotive types: a 3,000 h.p. 115-ton Co-Co or A1A-A1A; a 4,000 h.p. 126-ton Co-Co; a 6,000 h.p. 190-ton Co-Co-Co; and an 8,000 h.p. 240-ton Co-Co + Co-Co. These requirements can be met by two power plant assemblies and a standard type of bogie, which should be also suitable for electric locomotives. The anticipated performance is summarised in the table below.

Estimated performance of projected types

Load and gradient	**3,000 h.p. unit** m.p.h.	**4,000 h.p. unit** m.p.h.	**6,000 h.p. unit** m.p.h.	**8,000 h.p. unit** m.p.h.
1,000 tons on the level	68	79	95	—
2,000	51	60	61	80
3,000	43	51	61	69
4,000	37	44	54	61
1,000 tons on 1 in 200	43	55	68	82
2,000	25	35	46.5	55
3,000	18.5	25.5	34.5	43
4,000	14	19	28	35
1,000 tons on 1 in 100	29	38	51	62
2,000	12.5	24	31	38
3,000	10.5	13	22	28
4,000	7	7	16	24

"Instant engineering" will leave BR lagging

A further consideration must be stressed in relation to future locomotive development. This is the necessity of maintaining at least a nucleus of design and development staff. To whittle down these resources and stop further design and development at this stage will inevitably mean that, when the time comes for replacement and modernisation of the fleet, the user will be faced once again with the necessity of buying whatever is available at the time, instead of having intelligently planned and perfected designs ready for adoption. The results are only too predictable from past experience.

An alternative would be to do nothing but wait until the call for replacements and for more powerful locomotives was imperative, then hurry to assemble engines, transmissions and running gears which have proved themselves elsewhere. Apart from ensuring that the resultant fully proved motive power is bound to be five to ten years or so behind times, this policy would lead to innumerable pitfalls—an inevitability that is also fully documented by past experience. In addition, this brand of "instant engineering" is often likely to rely on licence agreements, and on development and remedial action originating outside this country. Its chances of success can be affected by the fact that experience elsewhere is not necessarily applicable to BR conditions. In any case, solutions along these lines would scarcely be to the long-term advantage of the railway or the industry as a whole, which would be relegated to imitating and producing at second-hand on the basis of achievements elsewhere. Neither British Railways nor the supply industry can economically or morally pursue such a policy of graduated opportunism.

Most administrations develop locomotives to suit their own requirements: the loading gauge, which affects the length, width, height of the centre of gravity and the permissible displacements; clearance from wheel flange to rail; axleloads; speeds and tractive effort requirements; and not least, local climatic conditions, which influence protection against weather in terms of high and low temperatures and air impurities. Tractive effort requirements are likely to vary widely. Whilst in the USA and Russia a high tractive effort will probably have to be maintained continuously over a long period, elsewhere—and particularly in this country—the tractive effort will vary almost continuously. This is conditioned by dense traffic, frequent checks and varying loads, all of which combine to demand from the power plant reliability as well as economy over a wide range of operating requirements.

Requirement for reliability and low cost

One essential in the new locomotives must be running gear requiring minimum maintenance and assured of good riding qualities with the lowest possible stresses on the track. This will require the design of simple and light bogies, with a layout that keeps weight transfer down. The bogies for Bo-Bo, Co-Bo or Co-Co locomotives should be suitable for both diesel-electric and electric locomotives; this is a rather obvious requirement, but it is so often and so consistently neglected that one must re-state it. The development of dynamic braking should be pursued in conjunction with the development of suitable disc brakes.

A standard type of traction motor developing about 600 to 800 h.p. per axle should be developed and used with all future locomotives in the 3,000 to 8,000 h.p. range. The generator design should be substantially covered by a scaled range to facilitate fault-finding and maintenance. A common control circuit and equipment should be used throughout and use should be made of automatic engine starting and power control equipment as far as possible; this development would be carried out in conjunction with manufacturers who possess the necessary background, as well as design, development and production facilities. The control system should be suitable for operation of propelled as well as hauled trains and should be simple and robust. It should be evolved with particular attention to reliability and ease of fault-finding.

The engines should be developed in collaboration with chosen manufacturers, whose previous experience in this field should be of decisive assistance. The engine should be turbo-charged and of a medium-speed traction type. The development should aim towards single shaft V-type engines, based on the use of a common cylinder type for the whole power range. A pressurised cooling system is an obvious requirement for a modern design since this permits appreciable reduction of the required space and of fan power; in addition, the topping-up requirements and the tendency to corrosion will be appreciably reduced. The resultant engine range should in turn utilise a common range of air cleaners and oil filters, as well as instruments and auxiliary equipment. Similar considerations should be applied to brakes and train-heating equipment.

Development needs 3–5 years

The design, development and service proving of a new locomotive requires about three to five years if ultimate reliability is to be assured. It might be possible to reduce this period with the aid of carefully planned rig tests devised to verify the ability to face the static and dynamic stresses likely to be encountered at critical points. Similarly, the assessment of the reliability of engines and transmissions or of certain components or assemblies could be facilitated by rig testing or by dynamometer running. The layout of the engine and transmission compartments, including the complete cooling and fuel system assemblies, should be cleared with the aid of a full-scale working mock-up. This should permit the running of the power plant over the entire range of loads and speeds, with particular reference to the thermal conditions faced by the installation. In this way it should be possible to ensure not only a satisfactory design in terms of all-round accessibility, but also a most economic and effective layout of the cooling system and of the engine and transmission compartment cooling. The design should be released for prototype construction only when the layout and performance of the mock-up have been completed to the entire satisfaction of all likely to be concerned with the production, running and maintenance of the locomotive.

The design of the brake gear should be guided by considerations relating to the required performance, which in turn will be determined by mechanical wear, maintenance and thermal stress considerations; these last are seldom allowed for. The running gear can now be satisfactorily designed with the aid of a number of relatively simple equations; but to get the best results, particularly so far as the effect of the locomotive on the track is concerned, it will be desirable to make use of analogue and digital computers as well.

The noise emitted at standstill and in motion must be rigidly restricted to specific levels both in the cab and in the vicinity of the locomotive. This will call for a considerable amount of theoretical and experimental work to achieve the desired result without undue expenditure of space, weight and cost,

Concluded on page 223

PADDINGTON-WORCESTER SPEED-UP

THE Paddington–Worcester express services are to be accelerated as from June 14. The new schedules are based on a maximum load of 350 tons and haulage by BR/Sulzer Type 4 2,750 h.p. diesel-electric locomotives. Standard schedules are exemplified by the following two timings:

	DOWN		UP	
	arr.	*dep.*	*arr.*	*dep.*
Paddington		9.15	17.45	
Reading	9.47	9.50	17.04	17.07
Oxford	10.20	10.23	16.32	16.35
Kingham	10.45	10.46	16.11	16.12
Moreton-in-Marsh	10.55	10.56	15.58	15.59
Evesham	11.11	11.12	15.38	15.39
Worcester	11.30			15.25

The schedules include 8 min recovery time in the down direction and 13 min in the up. Some of the timings are very smart, e.g. Paddington to Reading in 32 min (67.5 m.p.h.), Worcester to Evesham in 13 min (63.7 m.p.h.) and Kingham to Oxford in 20 min (64.7 m.p.h.). Three trains, the 17.15 from Paddington, 7.40 and 11.25 from Worcester, will run non-stop between Paddington and Oxford in exactly 60 min. The last up train of the day, the 19.00 from Worcester, is scheduled to be hauled by a Hymek 1,700 h.p. locomotive and is therefore limited to 140 tons (four coaches). The BR/Sulzer Type 4 locomotives will gradually take over the services from April 25 and will be in full operation by the start of the summer service.

English Electric are about to deliver the 2,000th EE traction diesel engine produced for British Railways —an appropriate moment for a review of the company's diesel traction achievements

ENGLISH Electric's collective railway traction experience spans as much as 130 years. Within this period it has had nearly 30 years' experience of the design and construction of main-line diesel-electric locomotives for many of the world's railways. As a prelude to discussion of English Electric performance at home, it is well worth recalling that the company had already delivered over 500 diesel-electric locomotives before BR acquired their first main-line diesel. The company has supplied about two dozen different railway systems, including British Railways, with their first diesel-electric locomotives.

English Electric railway traction activities are generally organised into the traction division and the diesel engine division. The traction division has its headquarters and main engineering departments at Bradford; the electrical equipment is built at Preston; and the completed locomotives are assembled at Newton-le-Willows. Diesel engines are built both at Preston and Newton-le-Willows. Napier Deltic and Dorman rail traction diesel development is the responsibility of the two subsidiary companies.

Apart from electric locomotives and power equipments for BR and export, orders for diesel-electrics now going through the shops include Type 1 and Type 3 diesel-electric locomotives, 1,600/600 h.p. electro-diesel locomotives and m.u. equipments for BR; 1,950 h.p. diesel-electric locomotive equipments for Western Australian Government Railways; 1,650 h.p. diesel-electric locomotive equipments for Queensland Government Railways; 550 h.p. diesel-electric locomotive equipments for South Australian Government Railways; and diesel-electric m.u. and coach equipments for the Ulster Transport Authority.

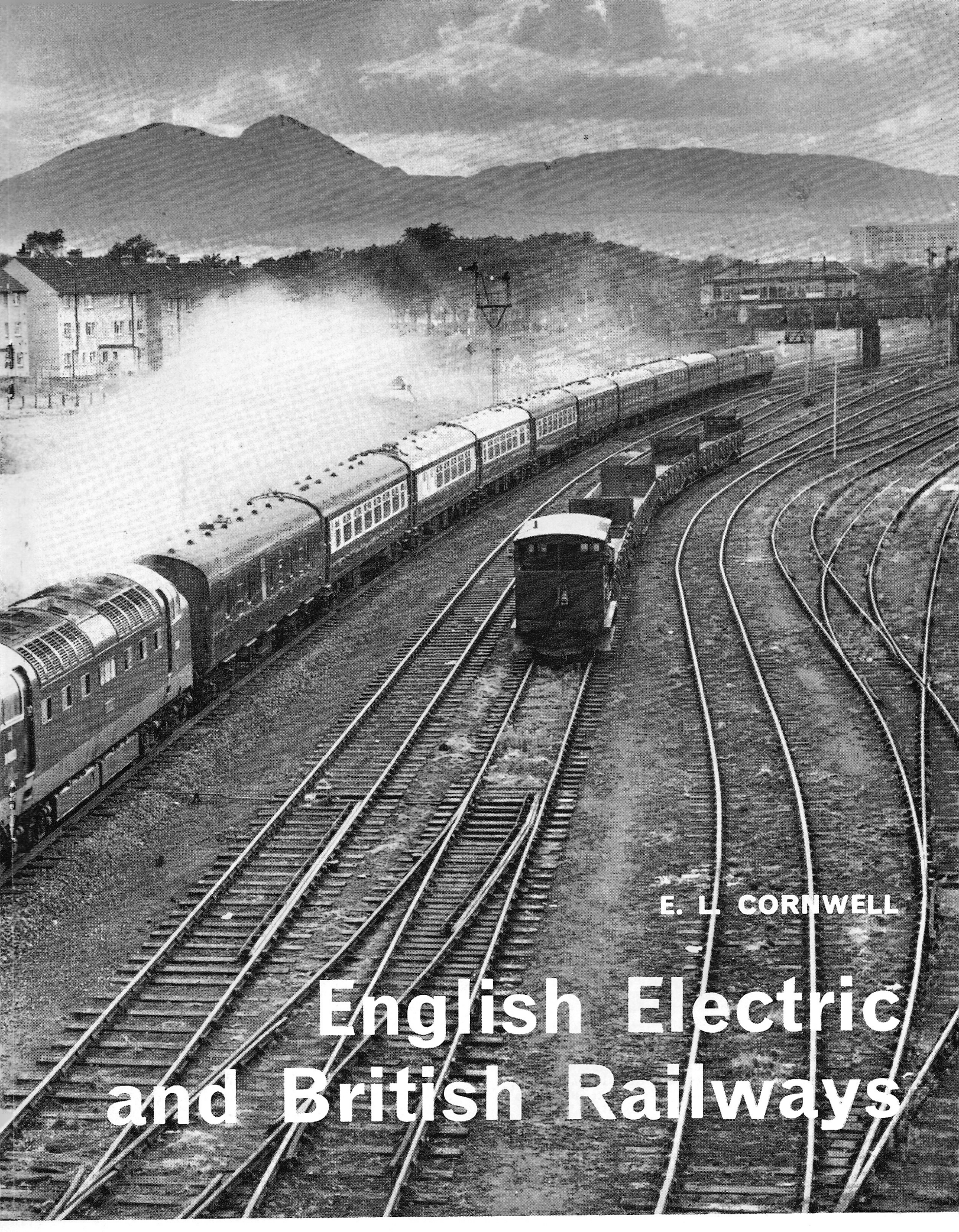
With the straight electrics as well, production has had to be highly organised to meet the pressures for deliveries and the company feels the loss of its Darlington facility. This fell a victim to earlier BR stop-go ordering policy and once closed has been impossible to rehabilitate.

In the field of rail traction, English Electric possesses, of course, a long and successful record of designing and building locomotives to suit individual railway requirements, within a general framework of a high number of standard components developed out of extensive service experience. Any manufacturer can obtain a single order from a railway by one method or another, but a manufacturer can only stay in business if he gets a succession of orders from each of his customers. That can only be achieved if the locomotives themselves are successful. The extent of EE success can best be gauged from the fact that about 30 of its diesel-electric designs alone have been the subject of one or more repeat orders from a dozen or more operators, and that English Electric has been responsible for 80 per cent of all diesel-electric locomotive exports from the UK during the past eight or nine years.

Achievements in Africa

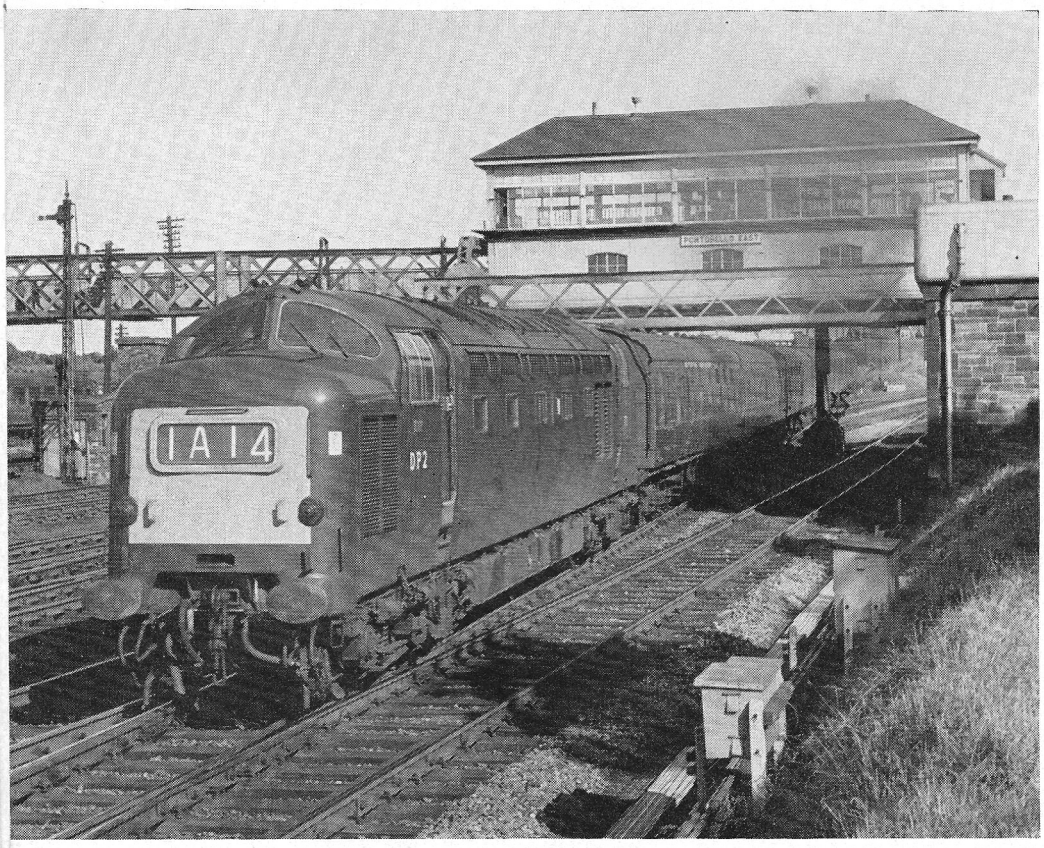
Of the various examples that could be given of design to meet particular requirements (aside from the Deltic, to which we shall return later), the 3ft 6in gauge main-line 1Co-Co1 diesel-electric design for Rhodesia Railways is well worth recalling. After experience with 35 units incorporating the 16-cylinder engine rated at 2,000 h.p. (1,710 h.p. at site)

English Electric 3,300 h.p. Type 5 diesel-electric No. D9003 *Meld* at Portobello on its departure from Edinburgh with the up afternoon "Talisman" for London. *Photo by Eric Treacy*



E. L. CORNWELL

English Electric and British Railways



Left: The English Electric 2,700 h.p. diesel-electric prototype No. DP2 passes Portobello East Box with the 10.10 Kings Cross–Edinburgh.
Photo by Eric Treacy

Right: English Electric 1,000 h.p. Type 1 diesel No. D8072 climbs Beattock bank with a northbound freight, assisted in rear by a Class 4 2-6-4T, on May 27, 1964.
Photo by D. Cross

Below: English Electric 1,750 h.p. Type 3 diesel-electric No. D6846 backs an iron ore train into the Richard, Thomas & Baldwin works at Ebbw Vale on August 15, 1963. *Photo by A. J. Wheeler*

delivered on two orders placed in 1955 and 1958, a third order was placed in 1962 for a further 16 locomotives incorporating the 12-cylinder engine rated at 1,875 h.p. (1,850 h.p. at site), which regularly haul the same loads as the Beyer-Garratt steam locomotives, though weighing 30 to 50 tons less. The 1Co-Co1 wheel arrangement has been designed to provide a maximum axleload of 13½ tons; combined with an inter-bogie coupling device, it gives excellent riding characteristics and the very high tractive efforts of 60,000 lb. maximum and 40,000 lb. continuous at 13 m.p.h.

The 24 rather similar 1Co-Co1 1,840 h.p. metre-gauge locomotives for East African Railways (10 in 1960, 14 in 1964) are also notable and provide the same maximum axle loading and tractive effort. Powered by a similar EE 12CSVT pressure-charged and intercooled diesel engine, they maintain a rated output of 1,840 h.p. through a temperature range from below freezing to 100 deg. F. and over the highest railway summit in the Commonwealth, with an altitude of 9,136ft. The EAR&H locomotives are also fitted with rheostatic braking.

DP2's excellent record

The Co-Co locomotive DP2 represents an outstanding development of the established English Electric 1Co-Co1 2,000 h.p. Type 4, of which the 200 delivered to BR between 1958 and 1962 had accumulated 65m. miles in revenue-earning service by the end of 1964. The 16-cylinder pressure-charged engine of the original Type 4, itself a development of the unit fitted to the first British main-line diesel locomotive, was developed, with the addition of intercooling, to 2,700 h.p. in the DP2. Advantage was taken of general advances in electrical equipment and locomotive design to eliminate the two undriven axles and, in a similar overall length of 69ft 6in, to reduce the working-order weight from 133 to 105 tons. The original maximum axleload came down from 18 to 17½ tons, maximum service speed was raised from 90 to 105 m.p.h. and tractive efforts were impoved from 52,000 to 55,000 lb. maximum and from 30,900 lb. at 18 m.p.h. to 36,000 lb. at 21½ m.p.h. continuous.

While the introduction of some radically new idea catches the general attention, true progress in railway engineering is more often the result of steady and persistent improvement of existing basic designs and quite startling progress can be made in this way. It is interesting to compare DP2 with No. 10000. Both

locomotives have the same wheel arrangement, carry train heating boilers and are powered by the English Electric 16-cylinder engine. No. 10000 was rated at 1,600 h.p., weighed at least 128 tons and had a continuous tractive effort of 15,000 lb. geared for a maximum speed of 85 m.p.h. DP2 has twice the power-weight ratio, develops nearly 2½ times more continuous tractive effort and is geared for a considerably higher top speed.

English Electric considers that the DP2 has been the most intensively worked of the BR uprated Type 4 prototypes. Within two years of entering BR service it accumulated over 300,000 miles and over a period of 58 consecutive days achieved 43,000 miles operating passenger trains, some normally operated by Type 5 "Deltics", on the Eastern Region. At the recent 10,000hr inspection an engine strip confirmed a generally low rate of wear. The strip provided an opportunity to rebuild the engine with a number of features not originally available and at the time of writing DP2 was expected to re-enter BR service some time in April.

The "Deltic" record

The "Deltic" enterprise, which led to the ordering of 22 locomotives for the Eastern Region in 1960 after extensive trials with the prototype, was viewed by some railwaymen with misgiving and by others as sheer lunacy. But use of the "Deltic" engine made the Type 5 3,300 h.p. diesel-electric locomotive with acceptable axleload practicable years earlier than if any other engine had been considered. Indeed, conventional engine design is only now, nearly 10 years after the prototype "Deltic" locomotive was completed as a private venture by English Electric, reaching the stage when it can begin to compete. Without the "Deltics" the ER express passenger service acceleration programme would have been much less spectacular.

True, the "Deltic" engine had its early service troubles (how many new rail traction engines have not?); and true, it entered service with the comparatively short time between overhauls of 4,000 hours. But the troubles were energetically tackled. With sensible rostering, the "Deltic" fleet soon achieved—and has retained—a quite unique level of intensity of operation. Offsetting its shorter overhaul life and the relatively high cost of the "Deltic" engine, maintenance requirements between overhauls are very low, being confined virtually to injector service at 2,000hr invervals. The exchange unit technique made possible through the low weight and bulk of the engine, which properly organised opens the way for a locomotive failed through engine or generator trouble to be returned to service within 8hr, may well by now have proved much more economical overall than traditional practice.

Meanwhile, time between overhauls is currently being extended to 6,000hr on engines with cylinder liners and pistons of later design, with four selected engines continuing to 8,000 hr. A further extension to 10,000hr overhaul life is the aim of current piston development, already well advanced.

As to operation, the intensive rostering of the "Deltic" locomotives, whose work includes the fastest trains in Britain, is already well known to readers of MODERN RAILWAYS. Latest information shows that during the 12 weeks in 1964 from June 15 to September 5 the 22 locomotives were scheduled to run 1,147,908 miles and actually achieved 1,042,685. This indicates a locomotive availability of over 90 per cent. When it is remembered that a major proportion of the 105,223 miles lost was probably caused by circumstances other than mechanical or electrical failure, the record becomes even better. Extrapolation indicates that if service throughout the year was maintained at summer peak level (which it obviously is not; the actual diagram mileage for the year was about 4.3m miles), an equivalent diagram mileage for the year would be about 4.9m miles, or 225,000 miles per locomotive annually; this is more than the mileage envisaged for the locomotives when they were ordered.

Standardisation of components

The excellent service record of English Electric diesel-electric locomotives owes much to the sound, if conservative, design of the RKT and VT ranges of diesel engines, all of 10in bore and 12in stroke and of open-chamber four-stroke type, which have been progressively developed over a period of more than 20 years. The RKT series is produced with four, six or eight cylinders in line and the VT engines have eight, 12 or 16 cylinders in two banks at an included angle of 45 deg. With the three stages of output provided by normal aspiration, turbo-charging and charge air cooling, the range of power outputs extends from 407 to 2,700 b.h.p. at turning speeds up to a maximum of 900 r.p.m. Over this wide range there is complete standardisation and interchangeability of pistons and cylinder liners, cylinder heads and covers, governors and governor

and auxiliary gear drives, valves and operating gear, connecting rods and all crankshaft bearings, fuel pumps, injectors, all cams and water pumps (except four-cylinder engines). This greatly simplifies spares provision and maintenance of mixed fleets. Depending on application, RKT and VT engines in railway service achieve average times between top overhauls of 12,000 to 15,000hr, with some units running to 30,000hr.

High-speed engines the next step?

Notwithstanding past and present record, the current type of slow-speed engine is probably nearing the end of its economical development potential. Although a 4,000 h.p. locomotive using two slow-speed engines and generators is possible within ruling axle loads on eight axles, it is apparent that development in that area and beyond would be considerably eased with engines of higher specific power, whether a single-engine or two-engine design is proposed. The most obvious step towards higher specific power is undoubtedly to go to faster running engines, which is now a developing trend with diesel-electrics and a *sine qua non* with diesel-hydraulics.

It seems clear that if English Electric was asked to tender for a 4,000 h.p.-plus locomotive for early delivery it could offer a fairly wide choice, using well-tried equipment. In view of the emphasis which the company lays on the need to keep one's feet firmly on the ground and to match development with experience, it seems likely that it would not put forward a single-engine design at the present moment because of the lack of a proved 4,000 h.p. engine from any source. Engines of a suitable type are in course of development and a single generator for such a power is possibly beyond the limits of present d.c. practice. The alternative would be an alternator with solid-state rectifiers, which at present might be more costly than a d.c. generator.

Alternative 4,000 h.p. designs

Left to make a proposal, the company would probably favour a 1Co-Co1 design using two of its established V12 engines. This could be done inside 67ft overall length and a 19-ton axleload and have the advantage of using known and fully proved equipment. It would also have better sales potential in export markets. As with the Rhodesia and East African 1Co-Co1 locomotives, the bogie design would incorporate that rather special English Electric expertise and make a better-than-average contribution to good riding and tractive effort, providing the flexibility required to meet the two basic reasons for interest in higher-power locomotives—haulage of heavier freight trains and acceleration of passenger trains. (In the freight working context it is of interest that in a recent exercise to meet an overseas requirement the company laid down a 3,500 h.p. diesel-electric design that produced the same tractive effort as a German 4,000 h.p. diesel-hydraulic.)

As an alternative design for early delivery the company could put up a "Deltic"-powered Co-Co locomotive well within the 18-ton axleload. The "Deltic" engine now has an excellent service record on BR and a development potential well beyond that of conventional four-stroke diesels without running into weight and space problems. A third possibility for a 4,000 h.p. diesel-electric would be to put up a design with a new-generation English Electric or Dorman engine, as a longer-term proposal, or with an engine of other make for earlier delivery. For the last, the Paxman Ventura looks promising for a two-engine design, with possibly development potential to 5,000 h.p. within the 18-ton axle loading.

Whatever the design proposed, and indeed with future diesel-electric locomotives of more mundane power, incorporation of the most recent advances would be in accordance with English Electric tradition. The company's current investigations into adhesion, for example, is likely to lead to some form of notchless control, possibly with the driver selecting tractive effort rather than engine power. There will also certainly be advances in the application of static equipment and logic engineering in the control of locomotives. Emphasis will be paid to features which contribute to the real operating economy —reliability, low maintenance, simplicity—because the company is very conscious that the whole purpose of a locomotive is to haul trains at the lowest overall cost to the railway.

THE GERMAN FEDERAL'S NEW 125 m.p.h., 8,000 h.p. ELECTRIC

OVER four years ago the German Federal Railway invited a number of German locomotive builders and manufacturers of electrical equipment to submit designs for an electric locomotive capable of 200 km.p.h. (125 m.p.h.). A Co-Co type was stipulated to restrict the axle loadings. The design prepared jointly by Henschel and Siemens-Schuckert resulted in an order for, initially, four locomotives of the 8,000 h.p. E03 class, of which the first has just been delivered. Siemens-Schuckert was responsible for the electrical equipment and Henschel for the mechanical portion, and the final design was evolved in close co-operation with the DB Zentralamt (central design office) at Munich. To allow through running, the E03 is built to the Swiss loading gauge, the most restricted of those of the three standard-gauge systems—German (including Eastern Germany), Austrian and Swiss (including BLS)—electrified at 15kV. a.c. Total weight is 108 tons.

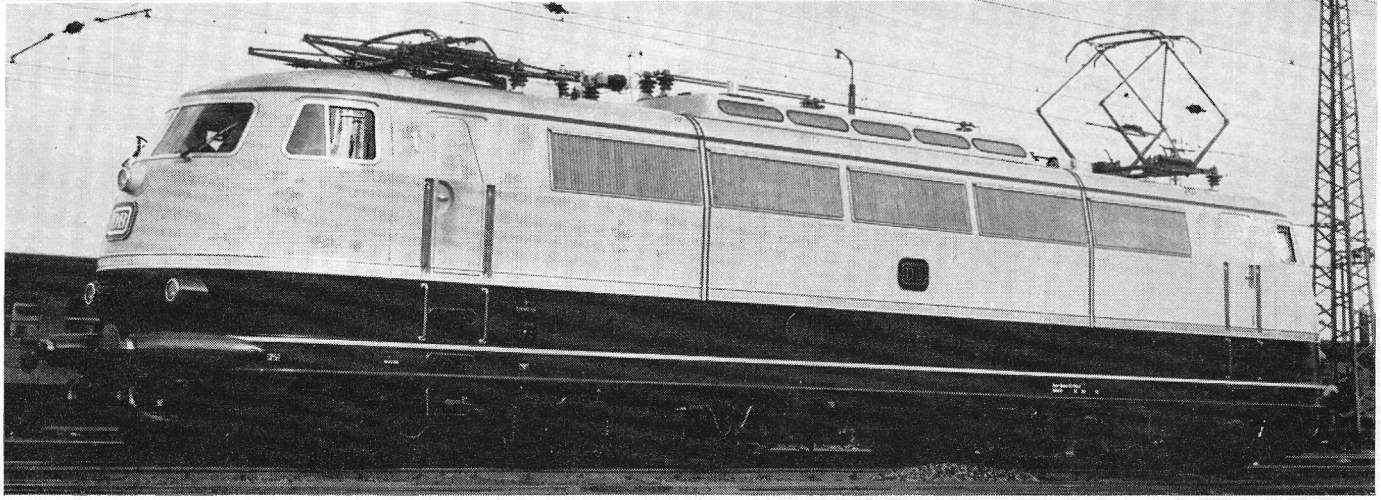
The six type WB36817 motors each have a continuous rating of 1,250 h.p. at the maximum speed of 200 km.p.h. (125 m.p.h.), or a total of 8,100 h.p. The one-hour rating at 125 m.p.h. is 8,750 h.p. Tractive effort at starting is 72,000 lb., with a reserve of 28,000 lb. at speed. The wheel diameter is 1,250mm (4ft 1in). The gear ratio is 1:1.74, but this has been modified for test runs achieving speeds of up to 250 km.p.h. (155 m.p.h.). The 39-notch controller is of Siemens design.

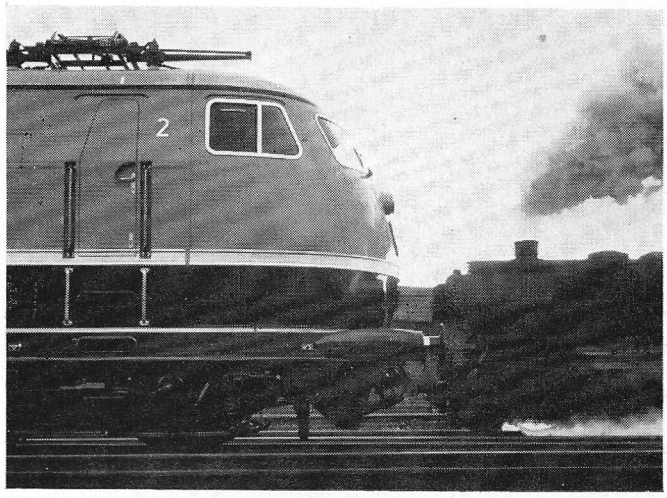
The basic structural element of the body is the fabricated underframe, since to save weight the sides, roof and other parts of the superstructure are of light metal. The underframe is built up of welded sheet steel. The design of the buffer beams allows of replacement of the existing draw-gear and buffing gear by centre couplers. The light-metal superstructure consists of five separate sections with a degree of elasticity in the joints between them to protect them against overstressing in the event of deformation of the longitudinal member by compression. This form of body was evolved from wind-tunnel and other experiments at the Hanover School of Technology. The bogie frames are of welded steel sheet in box girder form.

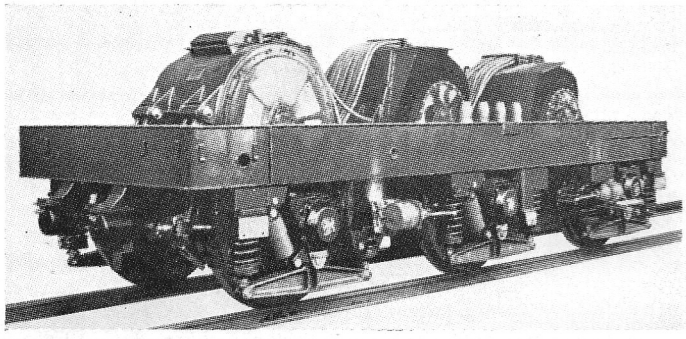
Two methods of transmission are fitted in different E03 locomotives. One is a form of cardan shaft developed by Siemens-Schuckert, and the other is a spring drive manufactured by Henschel. Movement is transmitted from the bogies to the body by a series of bars set at an angle to the longitudinal axis of the locomotive, an arrangement claimed to minimise weight transfer between the axles.

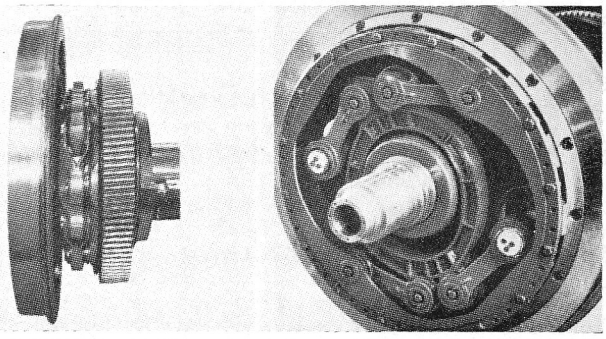
The rheostatic brake is independent of the electric power supply to the locomotive. An electronic control causes a brake application first to actuate the electric brake; the air brake comes into operation only when the electric brake does not achieve the desired retardation. Deceleration of an eight-coach (say, 320–350 ton) train from 125 m.p.h. can be at the rate of 19.6ft per sec^2.

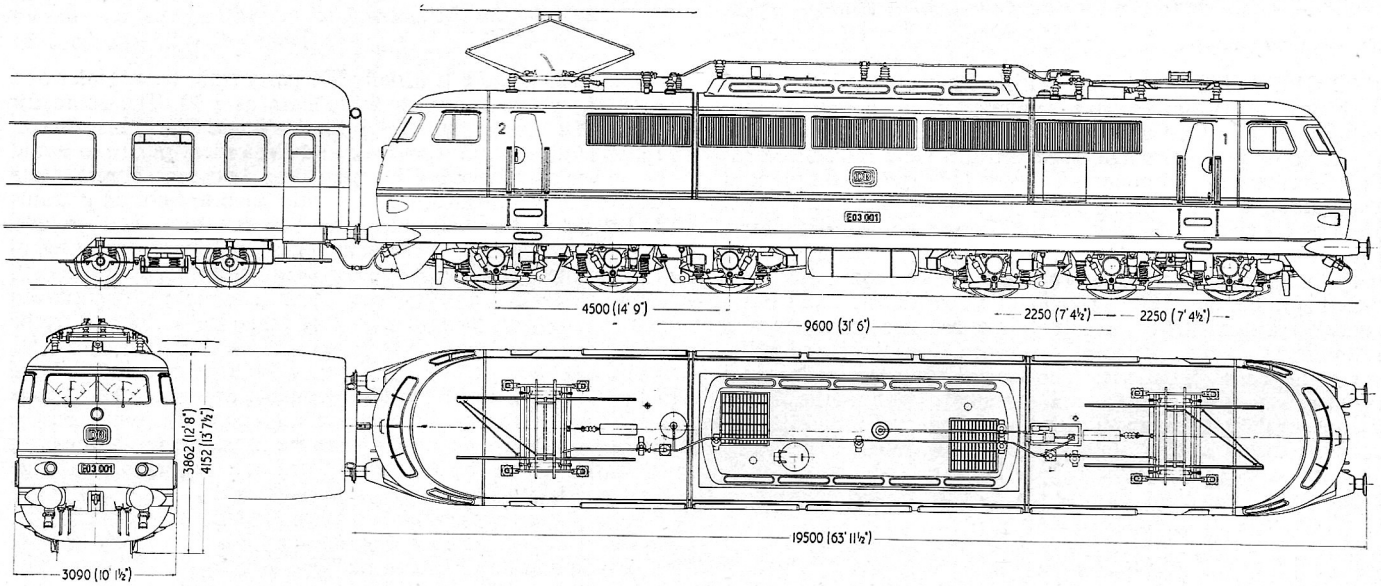
The E03 is the first DB class to be equipped with an automatic speed regulator. The driver needs only to set the regulator at the speed required, which is then maintained automatically, irrespective of gradients and wind resistance. It incorporates also the first installation in a standard DB locomotive of transmission by radio to the cab of the aspects and distances ahead of signals. This information is processed by a computer to indicate the permissible speed. All data as to signal aspects etc. are transmitted to the driver, who can read them in relative quiet even at maximum speeds.



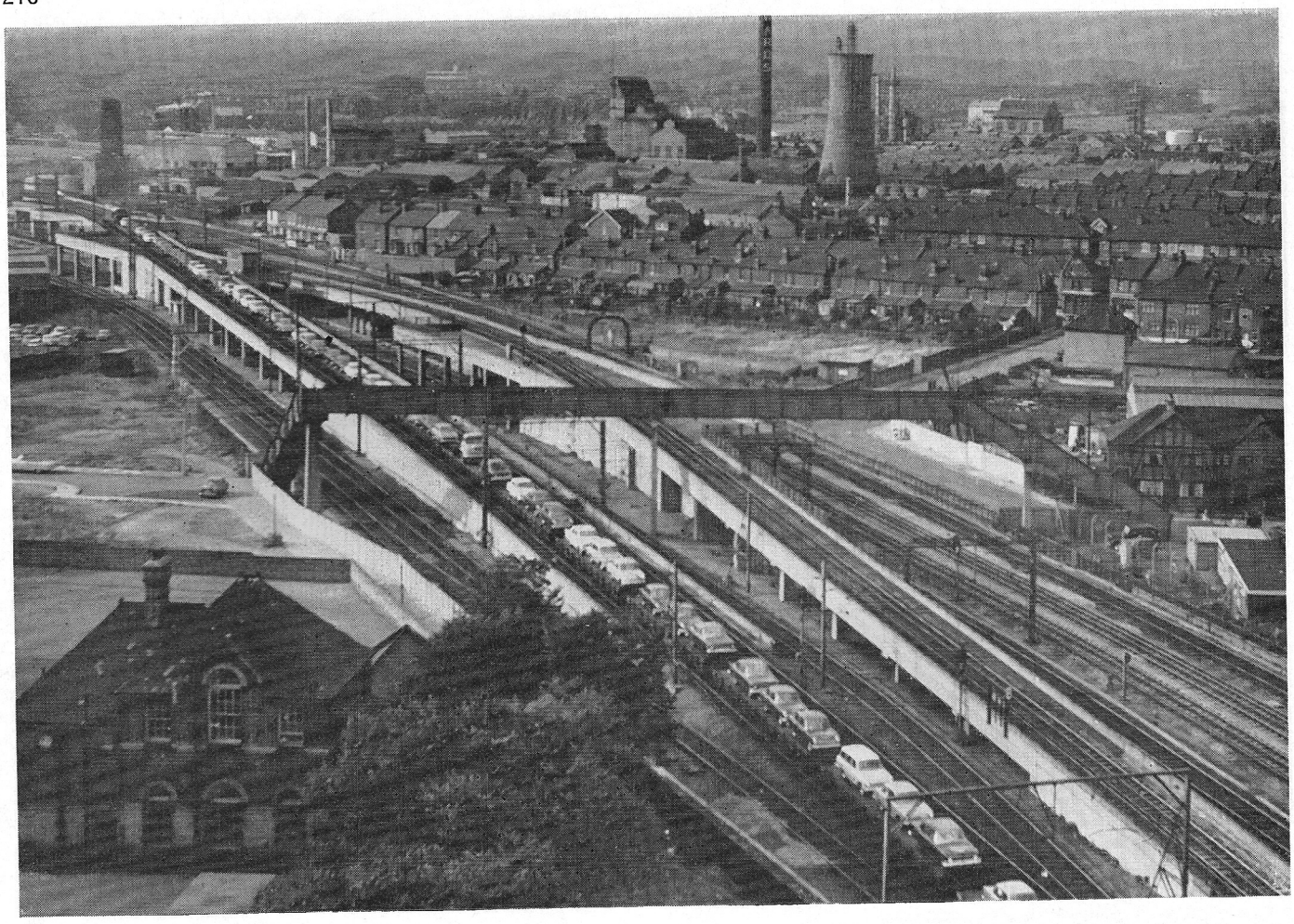








Detail of the new German Federal 125 m.p.h., 8,000 h.p. Class E03 electric locomotive. In the row of illustrations of bogie detail, the centre picture shows the Siemens cardan-shaft drive and the right-hand picture the alternative Henschel spring drive.



Above: An English Electric Type 3 diesel crosses the Barking flyover in East London with a Dagenham–Garston train of 22 car-flats conveying Ford cars. *Photo by British Railways*
Facing page: A Dagenham–Halewood train of Ford components approaches Tring, on the LMR West Coast main line, behind English Electric Type 4 diesel No. D299 on August 29, 1964. *Photo by B. Stephenson*

BR now run 60 Ford trains a week

Outstanding success of a still-expanding BR "company train" service

CO-OPERATION between British Railways and the Ford Motor organisation has resulted in a comprehensive pattern of train-load workings being developed during recent years. Some two years ago, special trains were introduced for the movement of components between the firm's main plant at Dagenham, on the ex-LTS Barking–Tilbury line, and its new plant at Halewood, near Liverpool. These trains virtually form part of the production line. The more recent development has been the gradual introduction of train services conveying completed cars between both Dagenham and Halewood and Bathgate (on an ex–NBR secondary line between Glasgow and Edinburgh), and more recently between Dagenham and Halewood in both directions. The components trains operate between specially constructed terminals within the firm's premises, all loading and unloading being by Ford. The car-carrying trains load at Halewood either within the factory or at a car railhead depot recently established at Garston Speke Sidings. At Dagenham cars are loaded in the BR Dagenham Car Terminal; at Bathgate unloading is in the BR depot.

Two components trains run daily except Saturdays:

Dagenham Dock	*dep.*	11.56	19.55
Halewood	*arr.*	18.53	3.12
	dep.	6.00	12.07
Dagenham Dock	*arr.*	12.49	20.05

In addition, there is a daily SX parts train from Halewood at 18.05, which is due in Dagenham at 1.30. The route for all the 15 trains in the weekly service is via Blackhorse Road, Upper Holloway, Gospel Oak and Willesden, partly to avoid the densely-trafficked GE main line between Forest Gate Junction and Stratford, which would have to be used if trains traversed the North London line between Victoria Park and Willesden. Even so, there must be some smart operating in view of the considerable traffic from other LTS line North Thames-side stations, of the LMR electric trains between Gospel Oak and Willesden and of intensive peripheral traffic generally.

The weekly "lift" by these trains includes over 1,000 Ford engines and many of the consignments are palletised. Trains consist of the brake-fitted pallet vans specially built for the service, which like the brake-vans are fitted with roller-bearing axleboxes. These are liveried in Ford blue and display a large Ford emblem (*see illustration opposite*).

Locomotives are normally changed at Willesden and Rugby. Power usually is Brush Type 2 or Type 3 diesels east of Willesden and English Electric Type 4s between Willesden and Rugby, where Type A electric locomotives take over; on completion of a.c. electrification to Willesden, the only motive power change will be there. The stock is normally worked

back on the next available timing, giving some quick turnround times as the timetable shows.

The total number of Ford vehicle trains is about 30 a week. There are three groups of movement: (a) between Dagenham and Bathgate via the East Coast route; (b) between Halewood and Bathgate via Carlisle and Carstairs; and (c) between Dagenham and Garston.

The first group consists of three trains weekly as follows:

Ripple Lane	*dep.*	22.26	MWFO
Bathgate	*arr.*	12.30	Th SO
Empties			
Bathgate	*dep.*	16.00	Th SO
Ripple Lane	*arr.*	5.30	WF SuO

The route is via Forest Gate Junction, Stratford, Victoria Park and Canonbury to Ferme Park, the service being maintained by one set of 22 carflats. Motive power is Brush Type 2s to Ferme Park and Brush Type 4s on the GN main line.

The Halewood–Bathgate movement consists of two trains weekly from Halewood at 0.12 WFO, due into Bathgate at 12.30. The cars are off-loaded and empties are off again to Halewood by 16.00. Trains consist of 22 carflats.

Trains catering for the third group of motor-car and commercial vehicles, between Ripple Lane and Garston, are:

Ripple Lane	*dep.*	0.05 MX	8.00	15.55 SX
Garston	*arr.*	6.30	14.30	23.00
	dep.	17.00 SX	21.45 SX	9.30
Ripple Lane	*arr.*	23.41	5.27	16.10

These afford some smart turnround times—32 hr, for example. The route is the same as for the components trains. The normal composition is 22 carflats, conveying an average of 75 vehicles northbound and 88 southbound. The loading discrepancy is due to the differing lengths of the models conveyed. From Dagenham, Cortinas, Zephyrs and Zodiacs and commercial vehicles are conveyed to Garston, the railhead for the Speke distribution depot for NW England. The southbound movement is of Corsairs and Anglias.

For loading at Dagenham, vehicles are driven by distributors' drivers from the Ford plant production line to Dagenham Car Terminal, where BR staff, who are apprised of the composition of the trainload, call cars forward. The BR staff allocates wagons in accordance with the known dimensions of the road vehicle (e.g. three Zephyrs to a carflat). On arrival at Bathgate, Garston and Dagenham vehicles are driven off by distributors' staff. In addition there are regular individual wagon loadings and *ad hoc* export movement of vehicles, arranged by Ford with the BR Agent at Dagenham.

Basic planning of these trains was by the Divisional Manager, Liverpool Street, and his Commercial and Movements Managers and staff with the Ford Motor Company; recently a BR Ford Liaison Officer, Mr. F. E. Pullin, has been appointed within the Division. Development is planned of other railheads covering all Great Britain that can be economically served from Dagenham and Halewood. Later this year, "Cartic 4" two-tier car-carriers are to be introduced, affording a 50 per cent increase in train capacity.

SCOTLAND WILL OPERATE BR'S FIRST MERRY-GO-ROUND IN 1966

BRITISH Railways' first "merry-go-round" working will begin in Central Scotland early next year. It will deliver coal to the South of Scotland Electricity Board's latest power station now nearing completion at Cockenzie, near Edinburgh. When in full operation, the Cockenzie station will use nearly 3m tons of coal a year. Initially, its coal supplies will come from a 3,125-ton bunker at the NCB's new Monktonhall Colliery, only 6 miles distant, near Musselburgh; when the station goes into full production in the summer of 1966 it will take coal from Bilston Glen colliery and the Newbattle Preparation Plant, also in the Lothians coalfield.

At the colliery, trains of the new BR standard brake-fitted hopper wagons will be loaded underneath the coal bunker, from which hoppers will fill five wagons simultaneously, each with exactly 32 tons of coal, in 60 sec. A single operator at a console will control delivery from the 88ft-high bunker into the wagons. The train driver will be controlled by a system of colour-light signals and will be required to stop his train within 6in of predetermined marks.

At Cockenzie power station the train will run non-stop at a steady 0.5 m.p.h., with the locomotive under control of the Hawker-Siddeley apparatus illustrated on page 171 of last month's issue, over hoppers into which the coal will be dropped through the wagons' bottom-discharge doors. Door-opening levers and safety devices on the wagons will be operated by lineside devices.

The Cockenzie trains will each consist of 28 wagons and will make five round trips a day between Monktonhall and the power station. Each wagon is costing over £3,000 to build, but it will have the capacity to move a daily load of 160 tons—as much coal as a miner producing 60 cwt. a shift in this highly-mechanised pit would dig in ten weeks. In one day a 28-wagon train will convey about 4,500 tons, or as much coal as the same miner would produce in six years.

Just over 80 wagons will be needed to feed the power station —compared with about 1,500 on the traditional pattern of coal supply to power stations of this size. Moreover, the old system would have needed at least 250 acres of sidings at pithead and power station to cope with an operation on the Monktonhall–Cockenzie scale. The plant now necessary at the pithead will cover no more than four acres. With 16-ton wagons carrying power station coal in the traditional fashion, the average wagon's workload is only about 22,000 ton-miles a year, or three loaded journeys a month. With merry-go-round

Concluded on page 219

Push-pull operation will cut SR's peak working costs

Attempts to make peaky commuter services more economical by cutting off-peak services have only aggravated the problem. A new Southern approach attacks the difficulty in a more promising way—the reduction of peak working costs

A PROBLEM which preoccupies all transport undertakings is peaky traffic and the waste of expensive assets which it entails when demand is low. The first remedy is—or ought to be—always to try to build up off-peak demand by any available commercial means, like the stand-by fares offered by BEA. But rarely is this fully successful. Hence the other line of attack, the minimising of peak working costs, must generally be followed as well. This may call for markedly different operating methods from those appropriate in the off-peak. In particular, the peak is a time when one is not so concerned to foster traffic, so that cheaper, older and less attractive equipment and services can be used; indeed, they ought to be used, so long as they are of reasonable standard from the travelling public's viewpoint and may help to keep down the peak-hour passengers' costs as well.

Very little has so far been done to explore these possibilities in the operating of British commuter rail services. Peak and off-peak services alike have been operated by the same types of equipment; and usually peak-hour services have of necessity been better and therefore more attractive than the off-peak. This may be social necessity, but it is commercial suicide. It has made the high-cost peaks grow, while the off-peak traffic has declined under the competitive impact of the motor-car. The situation has been aggravated by a search for whatever marginal economies could be secured by cutting off-peak services, and the off-peak traffic has been discouraged still further.

MoT diffidence discouraged BR push-pull

Casting around for ways to cut the cost of peak working, the eye soon lights on the large numbers of vehicles which may make no more than one round trip in their working day. In general the need to make the most of line capacity at peak times requires that they should be multiple-unit stock; not only, therefore, are the coaches themselves standing idle, which may be inevitable, but so is the equipment which drives them. If straight locomotive haulage is unacceptable as a means of freeing the equipment for work (on freight) during the off-peak, then push-pull working suggests itself. Surprisingly, only now are push-pull possibilities beginning to be investigated seriously in this country, although the practice is common enough abroad. It must be admitted too, that a certain diffidence at the Ministry of Transport about the idea of pushing more than two or three coaches, which has only recently been dispelled, has not given much encouragement to BR authorities.

Nevertheless, even if the obstacles are now removed, it must not be assumed that multiple-unit stock ought ever to be supplanted completely. A multiple-unit train is normally cheaper both to build and to run than the equivalent locomotive-hauled train. Minimising motive power and rolling stock costs is therefore no simple matter, even without the complication that the accelerative power and ability to divide and combine easily, which are characteristic of the multiple-unit train, are often vital to operational economy. One must make a careful assessment of the daily number of train-hours to be worked in the various freight and passenger categories and the maximum number and characteristics of trains that will be in action at any given time. It is not enough to assume that the ideal is attained simply by taking up whatever residual capacity can be found in the freight locomotive diagrams. To acquire an additional locomotive over and above the minimum needed for freight service might have the effect of releasing as many as five other locomotives for passenger work in the peak and so save six sets of multiple-unit equipment.

Oxted lines are the test-bed

The Southern Region is now beginning to move toward the modern concept of push-pull working. The proposals for the Waterloo–Bournemouth electric service are not strictly relevant to the issues under discussion here, except in the case of the few peak trains planned for locomotive haulage; the purpose of push-pull operation on the basic fast services of this route is to allow the economical projection of through sections over lines which it is not intended to electrify. However, having solved the technical problems of controlling diesel and electric locomotives of several different types by the same basic control equipment in the trailer vehicles, the SR is now ready to use the equipment in true peak-hour operation wherever it may prove valuable.

The first application is to be on the London–Oxted group of services. For some time, these have been worked by diesel-electric multiple-units, supplemented at the peak by diesel locomotive-hauled trains. These latter are to be replaced by push-pull sets to avoid the loss of locomotive time and the operating complexities of the present working methods, in which one locomotive brings the train into the terminal and another takes it out. The net effect will be to save one locomotive standing idle over the whole peak period at each London terminal.

"Translator" unit solves control problems

The control problem which had to be solved was that of using the electrical feeds understood by an electric multiple-unit equipment, which are transmitted down the train, and converting them on or near the locomotive into a form which the latter can understand. On a multiple-unit electric train, the commands which a driver transmits to the equipment by energising certain train wires progressively through his master controller are for an increase of power under automatic control up to one of the several levels he can set, or to hold the progression at any point it has reached; he cannot command the equipment to reduce power, except to zero. For passenger working at least this is adequate, but for freight it might be necessary to add a facility for reducing power. These commands are fundamentally in a form which can be given to any power unit, providing they are translated into a "language" it can understand. On BR, diesel locomotives receive their instructions in the form of a mixture of electrical feeds and variations of air pressure; all that is required is relatively simple equipment that will take the purely electrical feeds from the train wires and translate them into this form.

This translator unit can obviously be fitted either at the end of the trailer set nearest the locomotive, which requires locomotive-type control couplings between locomotive and train, or on the locomotive itself, which allows the simpler multiple-unit type couplings to be used. If operation is to be on any substantial scale, the latter is the better course, even though the locomotives have to be slightly modified and so become non-standard, although not to the extent of making them incapable of coupling to other unmodified locomotives. This is because there are fewer locomotives than ends of trailer sets, even if the latter are marshalled into block trains, and because if it is desired to use the trailer sets with more than one type of locomotive, translators and couplings have to be provided for each type.

Why old m.u. stock was chosen

These considerations apply whether the trailer sets are built new or converted from hauled or multiple-unit stock. In making a choice of stock to be converted, however, there are obvious advantages in using vehicles which already have air brakes (an operating convenience, not an essential to the principle), electric heating and control train wires—in other words, multiple-unit rather than hauled coaches. This has obviously weighed in the case of the Oxted services, where trailers from withdrawn Brighton express units and surplus Portsmouth express units, with the motor coaches acting as driving trailers, are to be used. On the other hand the greater expense of converting hauled coaches is being accepted for the Bournemouth line. With a little renovation of the older coaches, this ought to be a perfectly satisfactory as well as a very economical proposition.

The Southern is therefore heading towards a state in which all its multiple-unit electric sets and all its locomotives can be controlled by the same coding of train wires and can thus run in multiple with one another. Basically this is no more remarkable than that they should all have drawgear which can be coupled together, but it has taken a long time to recognise this and it opens up some very interesting possibilities. If this were the case universally on BR it would become even more interesting, not forgetting the possibilities in push-pull or multi-unit freight working.

SCOTLAND WILL OPERATE BR'S FIRST MERRY-GO-ROUND

Concluded from page 217

and 32-ton wagons, however, the annual ton-mileage is 3m per vehicle.

As the delivery line at Cockenzie is an adaptation of a rail system already planned, the coal trains will have to reverse out after unloading. But when the power station at Longannet, Fife—the next location for "merry-go-round" coal deliveries—comes into operation in about three years' time, operation will be pure merry-go-round on a circular route and non-stop.

Longannet will be served from the collieries at Seafield, Westfield, Manor Powis, Valleyfield, Blairhall and Comrie. As some of these are up to 30 miles away, the merry-go-round trains are to be fitted into the working timetables over lines busily trafficked by regular diesel passenger services. Current plans include a 3,750-ton bunker at Seafield—the principal supply point—and a 39-wagon train, hauled by three Type 1 diesel locomotives, of which each driver will be in radio communication with the others. The train will carry nearly 2,000 tons of coal on each of its four daily trips from Seafield.

First coal deliveries at Longannet, largely for stocking purposes, will be in 1968, but the station is not due to start producing electricity until early in 1969. Longannet will be served by 100 high-capacity wagons, compared with more than 2,000 required by conventional means of working.

THE LMR's MANCHESTER DIVISION INCREASES TONNAGE BY 10 PER CENT

A £500,000 rise this year in the freight revenue of the LMR's Manchester Division has been forecast by Mr. G. W. Brimyard, Divisional Freight Manager, Manchester. Reviewing performance so far at a recent Manchester press conference, he said that BR had already got rid of the bulk of traffic which it could never hope to make remunerative, but that movement costs and methods are under constant review in attempts to cut those of some marginal traffics which may, with effort, be made to pay.

In some cases traders can be persuaded to pay higher rates because of the advantages offered by rail transport. Sometimes, Mr. Brimyard conceded, margins had to be cut very fine to attract traffic, but no BR rates were deliberately made loss-leaders. Moreover, the comprehensive knowledge built up and kept up-to-date on costings ensures that rates are as remunerative as policy—the need to win the traffic—dictates in each case. The Railways Board and Regional and Line HQ allow the Divisional Commercial Manager considerable latitude in quoting rates.

"Company trains" are figuring to an increasing extent in Manchester Division operations. Lime and limestone are conveyed in trainloads from Peak Forest, Derbyshire, and ores and metals from Manchester docks; sand, gravel and cement are brought into the Manchester area in large quantities and also by trainloads averaging 600–800 tons. Recently there have been 70 trains a week to 12 destinations within a radius of some 150 miles. The destinations vary according to individual orders placed with the consignors. Over 2,750,000 tons were forwarded during 1964. The equivalent tonnage in terms of road vehicles would require 580 (15-ton lorries) operating daily and making a double journey.

In the past 12 months there has been a tonnage increase in the Division's freight of up to 10 per cent, largely owing to the expansion of company train movements, which enable quotation of very competitive rates. Negotiations to be completed in the next few months may lead to a further increase of up to 1m tons per annum. Bulk traffic by rail from Peak Forest alone was over 2m tons last year.

Plans are well advanced, said Mr. Brimyard, for company trains of general merchandise in addition to raw or semi-finished material. One example is anticipated bulk trainloads of breakfast cereals from a well-known manufacturer to distribution centres throughout the country.

Statistics show that as yet only a comparatively small proportion of the country's export trade is carried to the docks by rail. Many potential customers, some feel, are not sufficiently well-informed of the services BR can provide in this respect. Export Express services from Manchester give assured arrivals next day at the principal docks of Liverpool, Birkenhead, Hull, Goole and Grimsby (although it is recognised that Liverpool is near enough—30miles—to Manchester for many consignors to prefer road transport). Export Express services have the advantages of assured next-day arrivals for full wagonloads, fast transits, no extra charges, expert advice through BR's close contacts with shipping and forwarding agents, shipowners and brokers, the services of a full-time port liaison officer in the port of London, and a concentration depot at Liverpool Road, Manchester, for smalls consignments for Liverpool and Birkenhead. Traders in the North-West also have at their disposal the many BR freight facilities to and from the Continent, including the train ferry services, with a large variety of special types of wagon available for large-dimension loads, dangerous substances and other consignments. These operate via Harwich–Zeebrugge and Dover–Dunkirk between all parts of Great Britain and the Continent excepting USSR. Services leaving Manchester in the evening make a next-day arrival at Harwich Parkeston Quay.

There are a number of accredited forwarding agents in Manchester who operate train ferry groupage services, in addition to full loads from certain Manchester depots. Most of their traffic is Customs cleared at Manchester. A new inland rail-served Customs depot is to be built in Manchester.

Besides the approach to customers actual and potential, the Manchester Division, Mr. Brimyard emphasises, is constantly devising means to economise in the means of handling freight besides improving the service. Studies are being made, for instance, of the parcels train services to be operated after completion of electrification from Rugby to Euston. Much of the East and SE Lancashire textile and allied trades despatch goods as urgent parcels and their patronage depends mainly on the quality of service given by BR. Operation of parcels trains from the areas concerned is complicated by the railway geography of the area in relation to the lines electrified south of Manchester, assuming that maximum possible traffic is routed over the electrified lines to effect good utilisation. Recent economical freight movements include coal from a quarry, where it had been dumped, to South Wales, where the wagons were at once needed for outwards coal. Among movements under examination have been use of banana vans for conveyance to ports or adjacent destinations of return loads of commodities suitable for such vehicles.

Diesel depot for Ebbw Junction

A diesel depot is to be built at Ebbw Junction, near Newport, at a cost of over £200,000 to provide day-to-day servicing for up to 50 main-line locomotives and service and maintenance facilities for 40 diesel shunters. In the four-track shed two through roads will be allocated to main-line locomotives and the other two will have four berths for the maintenance of diesel shunters. All tracks will be pitted, with electric and compressed air points for portable tools. There will also be an overhead runway crane, injector testing facilities, and an oil analysis room, where all oil supplies will be thoroughly tested. Six fuel tanks containing 72,000 gal of diesel fuel will supply the entire needs of the depot, and a sand drying plant and locomotive washing machine are to be installed. Building will begin in May and the depot should be ready for use within 10 months.

BR/Sulzer Type 4 diesel No. D148 waits to leave St. Pancras with the 21.20 to Edinburgh on November 16, 1962.
Photo by A. A. Vickers

Train Running and Traction Performance

Cecil J. Allen

RECENTLY my opinion was asked as to what improvements might be effected in a certain train service, and the first point that I made in reply was that in my judgment it ought not to be possible that any modern service should be slower than that which was in operation over the same route in the best days of steam traction. The service in question has fallen badly below its speed level in 1939. This has led me to compare the main-line timetables of today with those which were in force from 1935 to 1939. With certain exceptions, average long-distance times in Great Britain today are shorter than in 1939, as they ought to be, and average duration of journey is doubtless of more concern to the public than the fastest times made by a few selected trains; but as to the latter the record of 1965 in few cases is better than and in some is inferior to that of the years immediately preceding the 1939–1945 war.

We will begin with the Western Region. Here the greatest advance to date has been on the main line between Paddington and South Wales, over which the frequency, maximum and average speed of the service already shows a substantial advance on that which was in operation in 1939; moreover this summer, with the completion of the continuous rail-welding programme at the London end of the route and the ending of the troublesome slack at Winterbourne for building the new underline motorway bridge, a further acceleration is in prospect.

To the West of England the "Golden Hind", with three intermediate stops but a light seven-coach load only, has cut by 5min the fastest non-stop time of pre-war years—the 4hr of the "Cornish Riviera Express" which became operative after the introduction of the "King" 4-6-0s in 1927. Moreover the up "Golden Hind" is 20min faster than the former up "Riviera" non-stop timing. When the latter began to stop at Exeter, the down and up Paddington–Plymouth timings were increased to 4hr 5min and 4¼hr respectively, and this poses the question—if the up "Golden Hind" can make the journey in 5min *less* than the down, why does the up "Cornish Riviera" need 10min *more* than the down? And why does the latter need no less than *eleven minutes* for the modest task of attaching the Torbay coaches at Exeter? As yet this train, though admittedly with the extra Taunton stop, is no faster than in 1939, but it is to be hoped that this summer it may at least be possible to restore 4hr timings, even with the Taunton and Exeter stops, between Paddington and Plymouth.

As to the Paddington–Bristol line, it is good news that this summer is to see a general 2hr standard timing over the 118.3-mile route, even with the inclusion of intermediate stops. As to what the minimum time will be as yet I have no information, but if it was possible for the "Bristolian" from 1935 onwards to make the run in 1¾hr—and for most of its history with no more than "Castle" 4-6-0 power—there can be little excuse, even with the Bath stop, for the 115min down and 119min up timings that have been worked to since the last general revision of this service. It will be recalled that with eight coaches No. 7018 *Drysllwyn Castle* has run from Bristol to Paddington *via* Badminton in 93min 50sec, and that during the brief currency, in 1959, of the 100min schedule, 2,200 h.p. diesel No. D805 *Benbow* took the same load down *via* Bath in 93min 48sec or 91min net. This being so, such a train as the "Bristol Pullman" certainly ought to be able to make the journey, Bath stop included, in 1¾hr, and it is to be hoped that something of this kind will be seen when the new timetable appears.

Over the Paddington–Birmingham line, with the transfer of all the London Midland passenger traffic during the electrification of the latter route to the Western Region, the frequency of the latter's service naturally is greater than before, though the average speed until now has shown but little advance. Two trains only cut below the 2hr standard of 1939, the 10.10 down Pullman in 1hr 55min and the 14.10 non-stop in 1hr 52min. And why, in the last timetable revision, had so many of the down expresses to suffer those fidgety little increases of 1 and 2min, increasing 2hr schedules to 2hr 1min and 2hr 2min? Even the down "Birmingham Pullman" is now allowed 2hr 2min, when it ought easily to make the run in under 2hr. We may hope that some improvements also are in sight here. They certainly are—and long overdue they are—in the service between Paddington and Worcester. More than sixty years ago there were non-stop expresses between Paddington and Worcester in 2¼hr, and by 1939 the 12.40 down, with an intermediate stop at Kingham, was making the run in 2hr 10min. The current timetable can show nothing better than 2hr 25min down and 2½hr up—granted, with four intermediate stops—but the situation is to improve this summer with a general standard of 2¼hr each way (*see page* 209).

What the modern motive power has in hand on existing Western Region schedules is well illustrated in a recent letter from J. L. Lean, recording some of his random observations. One of these was of the "Cambrian Coast Express", on a day when some trouble on the Bicester route necessitated diversion *via* Oxford; yet with another 18.7 miles to travel this express, on its two-stop 2hr timing from Birmingham, was only 7min late into Paddington. More than once the up "Golden Hind" has been seen to stop in Paddington at 10.45, which would mean a run up over the 142.75 miles from Taunton in not more than 117min, at 73.2 m.p.h. The up afternoon "Bristol Pullman", due at 17.20, has often arrived early enough to enable any passenger so minded to sprint round and catch the 17.10

down to Birmingham. "And only last Friday," the letter concludes, "the up 'Bristolian' made nonsense of its schedule by passing Southall 3min early after being reported 7min late through Uffington"—which would involve an average speed of 85.0 m.p.h. over these 57.4 miles. Such performances leave no doubt whatever as to the practicability of accelerated WR schedules.

London-Leeds timings could be better

On the Eastern Region, it is the Great Eastern Line that offers by far the brightest prospect. In 1939 one train in each direction—the "East Anglian", with a strictly limited six-coach load of 219 tare tons—made the 115-mile journey between Liverpool Street and Norwich in 130min, with one stop, at Ipswich. No other train was faster than 2hr 24min down and 2½hr up, and most were considerably slower than that. Today we have the beautifully integrated even-interval hourly service, with two-stop 120min trains and six-stop 2hr 25min trains alternating throughout the day, and each with nine-coach or ten-coach loads of over 300 tons. Over the Cambridge main line, although today's fastest time of 67min between Liverpool Street and Cambridge is 2min slower than the 65min of 1939, today's service frequency and average time are both much superior to those of 1939.

Out of Kings Cross, again, although the fastest journey time of 6hr between London and Edinburgh is no better than that of the steam-hauled "Coronation" in 1939, both the "Flying Scotsman" and the afternoon "Talisman" in each direction are now observing the same time, with tare loads of all but 400 tons as compared with the "Coronation's" 279 tons in winter and 312 tons in summer, and with the up "Talisman" making three intermediate stops compared with two by the down and one only by the up "Coronation".

When it comes to frequency and average times, however, 1965 can show a service with a general mile-a-minute average of all the day trains which is altogether superior to that of 1939. In general the same can be said of the Kings Cross–Leeds service, but here the surprise is that in 1939 the non-stop "West Riding Limited" could make the run in 2hr 43min down and 2hr 42min up, whereas the best we can show in 1965 with "Deltic" diesel power—granted, with a Wakefield stop and up to 381 tare tons of load as compared with the 1939 streamliner's 279 tons—is 3hr by the up "West Riding" and the up and down "White Rose" Pullmans. With the "Deltics" and no more than the 320-ton load of eight Pullmans, the "White Rose" ought to be able to make the London–Leeds run in comfort in not more than 2¾hr, Wakefield stop included.

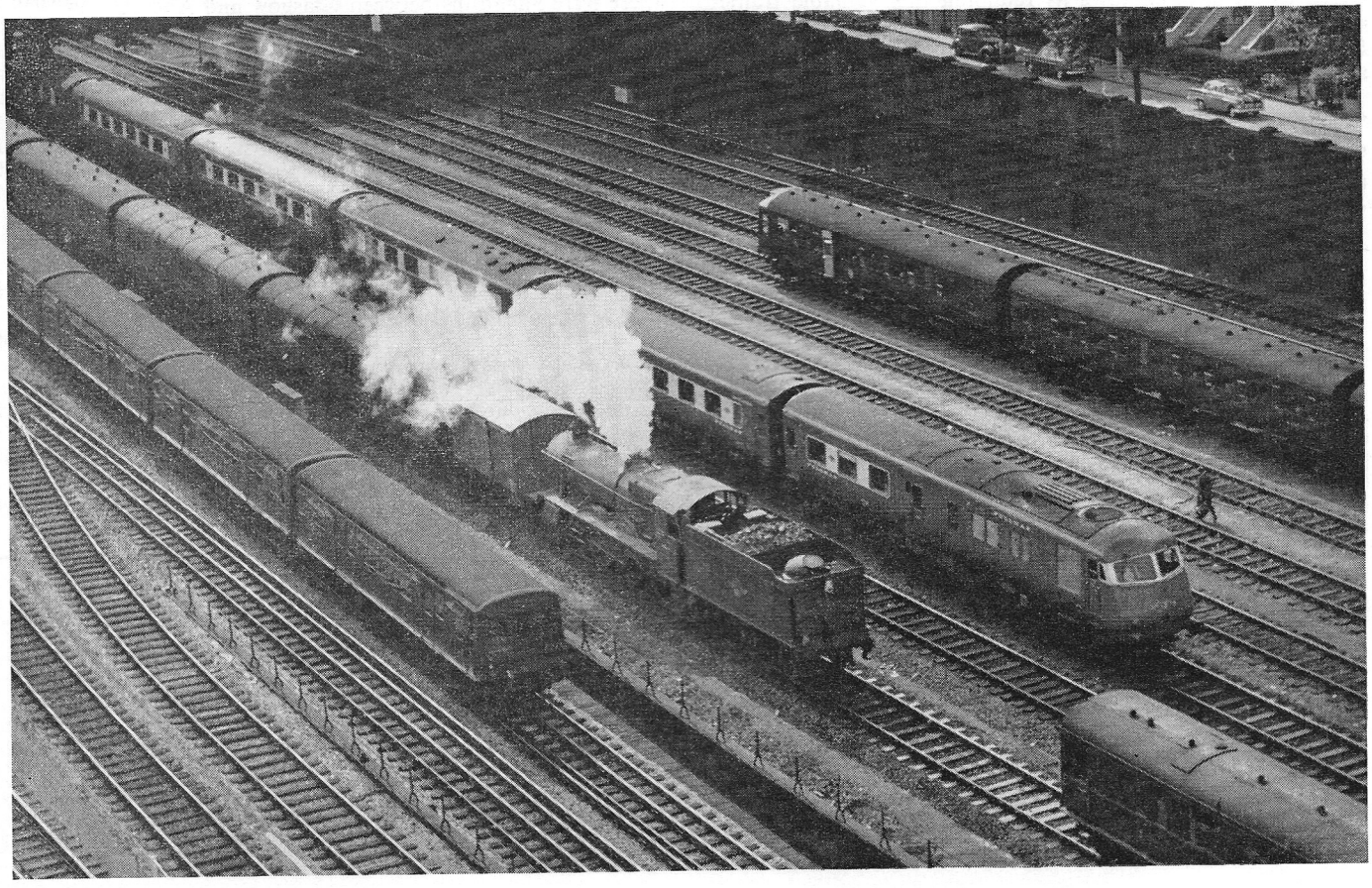
Cambridge poorly served from Kings Cross

There is one blot on the Eastern Region copybook, however, and that is the service between Kings Cross and Cambridge. Soon after the introduction of the "beer trains", as the new buffet formations were irreverently dubbed by their Cambridge *clientèle*, the times of the best of them were reduced to 75min down and 72min up, with stops at Welwyn Garden City, Hitchin and Letchworth. Even with a Royston stop included on certain workings, the steam power in use in 1939 could make the run in 77min down and 74min up. Today, with the further addition only of a stop at Stevenage, the same trains need 82 to 88min down and 83 to 87min up. For this badly lowered standard it seems difficult to find any justification.

The Midland Lines of the London Midland Region have done fairly well since the 1939–1945 war; most average journey times are faster than those of 1939, as also the quickest times between St. Pancras and both Leicester and Nottingham. Even to and from Sheffield, despite the faster times offered by the Eastern Region Pullmans, and the increasing severity of the speed restrictions north of Trent caused by mining, the average journey time has not fallen below that of 1939; but between Sheffield and Leeds mining troubles present an almost hopeless handicap.

The major defect in the service over the former Midland main line, however, is the drastic cut that the years have made in its service to and from Scotland. As compared with the 9.30, 11.30 and 13.30 expresses from St. Pancras to Glasgow in

An up WR "Blue Pullman" service passes a down LT Hammersmith & City working at the approach to Paddington near Royal Oak. *Photo by W. H. R. Godwin*



Midland Railway days, only the first, the present 10.15 from St. Pancras, still survives, and this means that the last through day train from Sheffield and Leeds to Glasgow leaves at 13.20 and 14.40 respectively. It is possible to start from Sheffield at 15.10 and with changes at York and Edinburgh to be in Glasgow by 22.30, while from Leeds at 17.35, with changes at York and Newcastle, the "Talisman" will get the passenger into Glasgow by 23.00. In the latter case, however, though the passenger starts only 3min later, he must pay for a journey all but 50 miles longer and arrive 40min later than in the through coach comfort of Midland days, more than half a century ago.

Leicester and Derby are enjoying a considerable benefit in train frequency by the temporary diversion of almost all the London–Manchester traffic to the Midland line. The "Midland Pullman", with its 3hr 10min run in each direction, is considerably faster than any service previously run by either the Midland or the London & North Western route, though of course first class only and commanding a substantial supplementary fare. As to the other expresses, the 3hr 35min of the present 9.25 down the Midland could all but parallel with 3hr 40min before the First World War, and in 1939 the "Peak Express" of the LMSR was making the run in 3hr 35min. Coming up, the Midland in 1914 could boast a 3hr 40min train, and the best time in LMSR days was 3¾hr, but today's 3hr 35min of the 12.25 up is certainly better than both. On the whole, however, no great advance in speed is to be seen on this service.

West Coast timings needlessly inflated

As to the Western Lines of the London Midland Region, "jam yesterday and jam tomorrow but never jam today" is about all that can be said. Electrification work on the main line is the excuse for the fact that no long-distance times are anywhere near the fastest that were being observed in 1939, except between Rugby, Crewe and Liverpool; though any benefit achieved here with electric power is more than nullified by the lavish recovery allowances for engineering speed restrictions elsewhere. In my judgment there is little or no excuse, however, for the further increase by 15 to 20min north of Preston in the West Coast Anglo-Scottish times, to allow for rail welding between Carnforth and Carlisle, or for the withdrawal of the "Caledonian", when every possible effort ought to be directed towards retaining this valuable traffic; and it is far easier to lose passengers than to attract them back to the trains when the service is ultimately improved. The same applies to Coventry, which in 1939 had its fine series of 92min trains to and from Euston, but today is more than 2hr away even by the fastest trains, all of which require a change at Rugby. Passengers to and from Kings Cross can count themselves fortunate that the planned electrification of their main line has been deferred if this has saved them the serious worsening of service over a considerable term of years that the electrification out of Euston has involved.

As to the Southern Region, times and train frequency over the Central Division between London and the South Coast have remained almost without change from the time of their electrification until now—that is, for 32 years so far as Brighton and Eastbourne are concerned. The much later electrification of the main lines in Kent, however, has conferred immense benefits in frequency and average speed on all the towns concerned, though as regards fastest times Folkestone is still no nearer London than the pre-war 80min, and the one 86min train from Cannon Street to Margate is only 4min quicker than the 90min non-stop afternoon schedule from Victoria to Margate of pre-war days. Only the Continental boat trains can show appreciably faster times; the 82min of the "Golden Arrow" from Victoria to Dover Marine, for example, compares with 90min in 1939. On the Western Division the services between Waterloo and the West of England have been completely changed, with great advantage to most intermediate towns but a lengthening of times between London and Exeter. To and from Bournemouth recent years have seen an increase in the number of 2hr trains, and some small improvement in average times, but as yet nothing as fast as the 116min down and 118min up of the pre-war non-stop "Bournemouth Limited" has reappeared in the timetables.

Biggest improvement in Scotland

The North Eastern Region has played its worthy part in the acceleration of the East Coast services and over its racing ground between York and Darlington now has what is probably the fastest average speed in Europe over a comparable distance. But apart from the Great Eastern Line, it is probably the Scottish Region which has shown the greatest all-round train service improvement in Great Britain since the war. It is true that the 3hr trains between Edinburgh and Aberdeen were paralleled nearly 60 years ago by a similar North British timing, but this soon had to be eased as proving beyond the capacity of NBR steam power at that time. Also there were 3hr trains between Glasgow and Aberdeen in 1939.

But what about such services as the four 2½hr trains daily between Aberdeen and Inverness—a journey which in 1939 took anything from 3¼ to 4¼hr? Or the accelerations which

1 LMR ST. PANCRAS–LEICESTER

Locomotive: Type 4 1Co-Co1 Diesel No. D55 (2,500 h.p.).
Load: 10 coaches, 342 tons tare, 360 tons gross.

Dist.		Sched.	Actual	Speeds
miles		min.	m. s.	m.p.h.
0.00	ST. PANCRAS ...	0	0 00	—
			p.w.s.	*15
1.55	Kentish Town ...	—	4 42	—
3.55	*Finchley Road* ...	6½	7 07	54
5.10	Cricklewood ...	—	8 50	75
6.95	HENDON ...	pass	12 57	*sigs*
		10	13 22	*0
		—	19 07	*sigs*
9.35	Mill Hill	—	19 27	*0
12.40	Elstree	—	24 37	55½
15.20	Radlett	—	27 00	83½
19.85	ST. ALBANS ...	21½	30 40	*70
24.60	Harpenden ...	—	34 32	83½/86½
27.25	*Chiltern Green* ...	—	36 28	*72
30.25	LUTON	30½	38 48	77½
32.75	Leagrave	—	40 47	82
37.25	Harlington ...	—	44 06	79
40.20	Flitwick	—	46 25	77½
43.75	*Millbrook*	—	49 06	86½/90
49.85	BEDFORD ...	44½	53 20	83½
53.00	*Oakley*	—	55 40	85
56.70	*Sharnbrook* ...	—	58 16	77½
59.75	*Milepost 59¾* ...	52½	60 54	69
62.70	*Irchester*	(†4)	62 57	85
65.05	WELLINGBRO' ...	61	64 54	*69
68.25	*Finedon*	—	67 22	79/80½
72.00	KETTERING ...	67	70 26	*64
74.60	*Glendon South Jc* ...	—	72 47	64/72
78.50	*Desborough North*...	73	76 15	67/79
82.95	MKT HARBOROUGH	77	79 55	*60
86.35	East Langton ...	—	82 48	77½
89.75	*Kibworth North* ...	83½	85 35	72/77½
95.40	*Wigston South Jc*....	89	91 10	*45/61½
99.10	LEICESTER ...	93½	95 20	—

2 LMR NOTTINGHAM–ST. PANCRAS

Locomotive: Type 4 1Co-Co1 Diesel No. D139 (2,500 h.p.).
Load: 13 coaches, 449 tons tare, 470 tons gross.

Dist.		Sched.	Actual	Speeds
miles		min.	m. s.	m.p.h.
0.00	NOTTINGHAM ...	0	0 00	—
2.85	*Edwalton*	—	5 29	53
5.40	*Plumtree*	—	8 07	61
8.25	*Widmerpool* ...	12	10 55	61
12.10	Old Dalby ...	—	14 23	72
14.30	*Grimston*	—	16 12	69/82
17.65	*Melton Junc.* ...	20½	19 12	*44
18.25	MELTON MBY. ...	—	19 59	—
22.00	*Saxby*	—	23 44	66
26.60	Ashwell	—	27 39	72
29.70	Oakham	32½	30 04	77½/87½
33.35	Manton	35½	32 49	*70
38.55	*Harringworth* ...	—	36 49	85
40.50	Gretton	—	38 29	*66
44.00	Corby	44	41 49	*50
46.45	*Geddington* ...	(†1)	44 18	71½/*45
51.50	KETTERING ...	52½	49 53	—
1.30	Kettering Junc. ...	2½	3 07	*25
3.75	*Finedon*	—	5 53	65/75
6.95	WELLINGBRO' ...	8½	8 33	*72
9.30	*Irchester*	(†1)	10 28	75
12.25	*Milepost 59¾* ...	15	13 15	61½
15.30	*Sharnbrook* ...	(†2)	15 38	90
19.00	*Oakley*	—	18 07	85
22.15	BEDFORD ...	24½	20 18	90
28.25	*Millbrook*	—	24 41	74
30.25	*Ampthill*	—	26 20	71½
31.80	Flitwick	32	27 35	76½
34.75	Harlington ...	—	29 59	71½/68
39.25	Leagrave	—	33 53	75
41.75	LUTON	41½	35 53	*72
44.75	*Chiltern Green* ...	—	38 08	82
		—	*sig. stop*	*0
72.00	ST. PANCRAS ...	70½	89 55	—

3 NER DARLINGTON–YORK

Locomotive: Type 4 1Co-Co1 Diesel No. D35 (2,500 h.p.).
Load: 10 coaches, 357 tons tare, 380 tons gross.

Dist.		Sched.	Actual	Speeds
miles		min.	m. s.	m.p.h.
0.00	DARLINGTON ...	0	0 00	—
2.55	*Croft Spa*	—	3 50	68½/77
5.15	*Eryholme*	7	5 50	74½
6.90	*Cowton*	—	7 15	83
10.35	*Danby Wiske* ...	—	9 36	90½/*78
14.15	NORTHALLERTON	13½	12 22	80½
		—	14 48	91/92½
17.60	*Otterington* ...	19	17 38	91/92
21.90	THIRSK	—	20 22	91/93
26.10	*Sessay*	—	21 40	91½
28.00	*Pilmoor*	—	23 24	93½
30.75	*Raskelf*	27½	25 46	91½/93½
34.35	*Tollerton*	—	28 29	93½
38.55	*Beringbrough* ...	33	31 10	*65
42.50	*Skelton*	37	34 18	—
44.10	YORK			

* Speed restriction. † Recovery time (min.).

PHOTOGRAPHIC CONTRIBUTIONS

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have brought the average time between Perth and Inverness down from 3hr 43min in 1939 to 3¼hr in 1965, between Inverness and Wick from 5hr 51min to 4hr 13min, and between Inverness and Kyle of Lochalsh down from 3hr 50min to 3hr 4min? There are past Scottish "bests" which as yet have not been restored, such as the 105min of the "Coronation Scot" in 1939 between Glasgow and Carlisle, or the 45min of the 17.10 from St. Enoch non-stop to Ayr; 112min northbound and 109min southbound in the former case are the best present times, though the one-stop 11.25 from St. Enoch now has got as near to the latter time as 46min. Even yet Scottish speeds in general are not spectacular, but the improvement effected over these difficult routes has been highly creditable. Thus in comparison with the past, the British train service picture is one of light and shade, though on the whole today with the light predominating.

Recent Midland experiences

A recent journey from St. Pancras to Trent, with a return from Nottingham, the latter with the heaviest load that I have ever timed on one of the fastest present-day Midland schedules, has provided a number of points of interest. The down run was on the "Thames–Clyde Express", with its normal ten-coach load of 342 tons tare and 360 tons gross, headed by 2,500 h.p. BR/Sulzer Type 4 diesel No. D55. Immediately after starting we had a 15 m.p.h. permanent way check, which cost perhaps ¾min, and then, having touched 75 m.p.h., we were brought to a stand by signals at Hendon after a crawl along the length of the platform. Mill Hill treated us in the same fashion, for what reason I am unaware. Then No. D55 got away in fine style and the driver soon began recovering the arrears of just over 9min with which we passed St. Albans. Here the prescribed slowing to 70 m.p.h. was made, and also round the reverse curves beyond Chiltern Green, where a similar restriction now apparently is in force; before the latter we had touched 86½ m.p.h.

Now came one of those oddities of locomotive handling for which it is always difficult to find an explanation. Down the 1 in 200 from milepost 34 the driver who had just touched 86½ m.p.h. in the dip beyond Harpenden allowed the speed to drop to 77½ m.p.h. along a stretch authorised for 90 m.p.h. and with the train behind time; as a result, the racing Luton–Bedford stretch was the only section on which we lost time, though to be sure no more than 32sec. Fortunately this was only a passing phase; 90 m.p.h. was reached before Bedford; the 3 miles at 1 in 119 to Sharnbrook summit were breasted without any greater fall in speed than from 77½ to 69 m.p.h.; and with the help of 4min "recovery" we were only 3½min behind time on passing Kettering. A reduction to 64 m.p.h. through Kettering seemed rather unnecessarily severe, and hampered the climb to Desborough summit; also speed was brought down to 45 m.p.h. for the Wigston curve some ½ to ¾-mile before we reached it; otherwise I believe we should have run into Leicester on time. As it was, the "Thames–Clyde" was only 1¾min late; we had run the 89.75 miles from Mill Hill in 75min 53sec, at a start-to-stop average of all but 71 m.p.h. From St. Pancras I should put the net time at about 85½ to 86min.

With the express 1¾min late away from Leicester, 80 m.p.h. attained by Syston, and 4min "recovery" in the schedule beyond Loughborough, an early arrival at Trent seemed "in the bag"—but not so. A slowing to walking pace at Loughborough preceded dead stands for signals at both Hathern and Kegworth. If I overheard correctly what was called out by one of the signalmen, three lengthy empty wagon trains had been allowed to take the fast line ahead of us—and with nothing to be seen on the goods line—and this was the result. Eventually, after the fine performance of No. D55 as far as Loughborough, we were 12min late into Trent. One cannot often fault Midland operation, but this did seem a case of mis-regulation.

Returning to London by the 16.24 from Nottingham, I was surprised to see no fewer than 13 bogies on the tail of No. D139, another BR/Sulzer Type 4, and imagined that the diesel, which certainly ran into Nottingham ahead of time, might be hard pressed to work no less than 470 tons to St. Pancras on so fast a timing as this. But I was soon made to think otherwise, for from the start we began steadily to gain time. Up the initial 1 in 200 we accelerated to and held 64 m.p.h., and had gained the first 1¼min by Melton Junction, increased to 2¾min by Manton. All speed restrictions were scrupulously observed, though I do not know what the reason could have been for the reduction to 50 m.p.h. at Corby; the final 45 m.p.h. slowing on this stretch was round the curve at Glendon South Junction. Even so, we were 2½min early into Kettering, having covered the 51.5 miles from Nottingham in 49min 53sec.

Brilliant work was to follow. With such a load as 470 tons I should scarcely have thought it possible, even with the assistance of 3min "recovery" in the schedule, to gain over 5½min from Kettering to Luton, but so it was; evidently the driver was getting some time in hand for a 15 m.p.h. permanent way check at Elstree. Notwithstanding a slowing to 72 m.p.h. round the Wellingborough curve, No. D139 swarmed up the 1 in 119 to Sharnbrook summit at a minimum of 61½ m.p.h. and then swept down to Bedford with a couple of 90 m.p.h. maxima, which helped to carry us up the long 1 in 200 to Ampthill at a minimum of 71½ m.p.h. and up the subsequent 1 in 200 to milepost 34 at 68 m.p.h. Once again a more than punctual arrival at St. Pancras, with 34½min left in from Luton, seemed certain, but no!

The last thing I expected was a similar experience to that going down, but so it was. Signals were on at Harpenden Junction, where once again we crawled to a stand. When we got the road, it was to cross to the up slow line, and to a second stop, this time at the junction starter. After a total halt of 5½min we proceeded, passing a couple of diesel multiple-units in Harpenden station, one of which may have been the cause of the trouble. So we continued on the slow line to Napsbury, where we were to cross back to the fast line. And here, believe it or not, we stood for another 5½min merely waiting for a down 5-coach local (the 17.53 from Moorgate, I should fancy), which by the time we came to a stand could not possibly have left Radlett and would not have been delayed by a single minute had we been allowed to cross its path directly we reached Napsbury. This really was bad regulation and contributed to the 19min lateness with which eventually we ran into St. Pancras. It was a sadly disappointing finish to what up to Chiltern Green had been such a grand run.

By the through running of the West to North trains by the Midland route into York and Newcastle, BR/Sulzer Type 4 diesels now find their way on to the North Eastern main line between York and Newcastle, and the run set out in Table 3, timed by I. J. Bliss, gives a striking example of their speed capacity on a virtually level track. It will be seen that No. D35, with a moderate 10-coach load of 380 gross tons, could comfortably maintain over 90 m.p.h. on the level and my correspondent ascertained that this was done without the diesel being worked at full throttle. The average speed over the 24.4 miles from Northallerton to Beningbrough was 90.8 m.p.h., and as a result the time over the 44.1 miles from Darlington to York was cut to 34min 18sec.

In conclusion, I am indebted to this correspondent and to D. R. Jack for pointing out a couple of slips in my log of the running of the up "Tees–Tyne Pullman" which appeared in the February issue. The time of passing Three Counties should have been 130min 53sec and not 131min 33sec, and of passing Finsbury Park 161min 17sec and not 160min 17sec.

BR MUST PURSUE A CONTINUOUS DEVELOPMENT POLICY

Concluded from page 209

and also to ensure that the limits are not exceeded throughout the service life of the locomotive. The noise-proofing must be blended into the overall design and not brought in as a series of afterthoughts based on the filling of cavities with sound-proofing mats and the spraying of surfaces with anti-drumming compounds, etc. Controls, heating and ventilation and auxiliary services to be provided for the driver deserve careful and detailed consideration. Nothing must be overlooked in the design and development, as well as in the road proving stage.

To abandon constructive studies and design and development would be to acknowledge defeat and to retreat to a technical subsistence level devoted to the past. The tendency to elevate last-minute improvisation, when a need for fresh development becomes inescapable, to the status of policy must be replaced by a clearly though-out, well-substantiated, forward-looking policy of locomotive development.

accident report

Derailment at Bethnal Green

THE derailment of an empty electric mutiple-unit train at Bethnal Green on February 12, 1964, was caused through the manipulation of the electric contactor equipment of a point control relay by a Signal & Telecommunications department technician, says Col. W. P. Reed in his report. (*HMSO* 3s 6d)

The accident occurred when the 10.42 nine-coach empty train from Chingford to Ilford via Liverpool Street, running on the up Cambridge fast line approaching Bethnal Green from Hackney Downs and routed to the up (Colchester) main line, was derailed at the fast line junction leading to the up suburban line through Bethnal Green platform. The front three coaches ran on to the up main line, the fourth and fifth coaches were derailed towards the suburban line bringing down overhead catenary supports, and the rear four coaches travelled on to the suburban line. This junction was the scene of another derailment on June 17, 1962, the report of which was summarised in our May, 1963 issue.

The cause of the present accident was clear and there was no conflict of evidence. During the morning the permanent way gang had been fettling the track in the vicinity of the junction and the signal dept. technician had been called as a precaution in case the disturbance to the track affected the point detection circuits. When work was complete the Bethnal Green signalman was asked to test the points. He found he could not set the points for the normal route (up fast to up suburban), but could do so for the reverse position (up Cambridge fast to up Colchester main), and therefore set up this route for the electric train. Meanwhile the technician, under the impression that he had possession of the points, manipulated the relay to free the latch and claimed that he inadvertently operated the contactor bar for the normal position; realising that his action might be dangerous he immediately manipulated the reverse contactor. By this time the train was passing through the junction and the technician's action changed the points under the train, initiating the derailment.

The evidence showed that there was some uncertainty in the scope allowed to a technician in testing equipment before the nature of the work required him to take formal possession of the equipment in accordance with the rules. Senior S&T Dept. staff observed that this sort of test should be arranged by consultation between signalman and technician; since the action assisted the equipment to perform its proper function, there was no need for formal possession, but the staff concerned should reach a clear understanding on what was to be done. In this instance the technician had asked the signalman to swing the points; on learning that the normal route could not be established, he had assumed that there was a failure. The technician's action, said Col. Reed, was ill-advised and in his opinion was flirting with danger. The custom had developed in a praiseworthy effort to reduce delays, but it is obviously unsound and should be checked. The instructions detailing the procedure to be adopted by technicians during testing are to be clarified for the future. Work is also in hand here and elsewhere in ER relay interlockings, to replace this particular type of relay with the modern totally enclosed sealed type, but the changeover will not be completed for some years.

Derailment at Cheadle Hulme

The driver of a special train carrying schoolchildren from Gonsall, on the Wellington–Stafford line, to York, via Stoke and Macclesfield, on May 28, 1964, is held responsible for the derailment of the train as it passed through Cheadle Hulme station by Col. W. Reed, the Inspecting Officer, in his report (*HMSO* 1s). Two children and one of the railway organisers of the party were killed and 27 children and adults injured in the accident.

Cheadle Hulme station is the junction between the North Staffordshire main line from Stoke and the electrified Crewe–Manchester line. The sharply curved approach of the Stoke line through the station to the junction normally demands a 45 m.p.h. speed restriction, but, at the time of the accident, a 10 m.p.h. temporary restriction was in force because of the renewal of an underbridge on the 16ch curve at the Stoke end of the station. The track over the bridge was supported by temporary waybeams, to which alternate sleepers were bolted and clamped, the normal practice in bridge reconstruction, although the curve and the skew of the bridge in this instance had entailed the provision of specially-built waybeams.

From the evidence it was clear that the train, which was hauled by a Class 5 4-6-0, had run over the temporary bridge at a speed of at least 45 m.p.h. The track on the bridge had been displaced towards the outside of the curve and several sleepers, no longer fully supported by the waybeams, had snapped close to the chairs of the outer rail, thus allowing the track to spread and initiate the derailment. The locomotive and leading four coaches parted from the rest of the train and stopped about 130yd beyond the station with the fourth coach on its side. The rear five vehicles were derailed and came to rest in the station; all were damaged by scraping along the platform edge and two were slightly telescoped.

Details of the temporary speed restriction, which had been in force for some months, had been shown in the weekly engineering notices, and the section of line was marked by the usual "warning", "C" and "T" boards. The warning board, however, was not of the standard pattern and consisted of a short unpainted plank with two holes for the lamps but without the normal V-shaped notch and point.

The driver said in evidence that he had not travelled over the line for some months and had missed the warning board; he was aware of the speed restriction and claimed that he had reduced speed to about 10–15 m.p.h. before reaching the "C" board. Col. Reed, however, is satisfied that the accident was caused by excessive speed and concludes that the driver had forgotten about the speed restriction and, having missed the warning board, was not reminded of it. Col. Reed observes that the driver's evidence about the running of the train was far from reality.

Col. Reed criticises the use of a non-standard warning board and stresses the need for such boards to be brightly painted to ensure that they are conspicuous. The accident showed that the clamps and bolts holding alternate sleepers to the temporary bridge were the weakest parts and he recommends that on curved temporary waybeams every sleeper should be fastened to the waybeam as is the practice on some other Regions. He reiterates the necessity for the prompt removal of electric current from the overhead conductor wires in the event of an emergency and observes that there was some delay in this instance.

PRESENTATION OF WINDOW TO LONGMOOR CHURCH

Brig. C. A. Langley writes :

SIR,—In July a new Army Corps will be formed, the Royal Corps of Transport. The Royal Army Service Corps will be given this title when it relinquishes its supply functions and retains only its Transport component, which will be amalgamated with the Movement and Transportation Branches of the Royal Engineers. Longmoor will become the School of Transport, where training in the rail, road and movements requirements of the Service will be concentrated.

The two Corps Committees—RASC and RE—have agreed to my suggestion that a stained glass window representing the new Corps should be presented to the new School of Transport and installed in the nave of St. Martin's Garrison Church at Longmoor, where so many memorial windows present a notable heraldic display and commemorate transport men throughout the world who have given their lives for their country in two World Wars.

The work is being undertaken by Lawrence Lee, A.R.C.A., who designed some, and was associated with all, the Longmoor memorial windows. I hope that the new window will be installed by the end of the year and dedicated on an appropriate date next year.

The new window will contain in the top half the figure of St. James the Great mounted on his white charger, and in the bottom half the crests of the three Corps within the compass of a wagon wheel. The supporters will be a Sapper and an RASC Driver each in full-dress uniform and holding his Corps flag. The coats of arms of towns and cities associated with the two Corps will be suitably spaced throughout the window.

Both Corps Committees have contributed generously to the cost of this work, but I feel that many serving and retired Movement and Transportation officers and men of the Regular and Army Emergency Reserve would like to contribute to this gift, which should be as great an inspiration to the new Corps as the beautiful memorials have been to so many of the old Corps.

Should any readers wish to subscribe will they kindly send contributions to:—

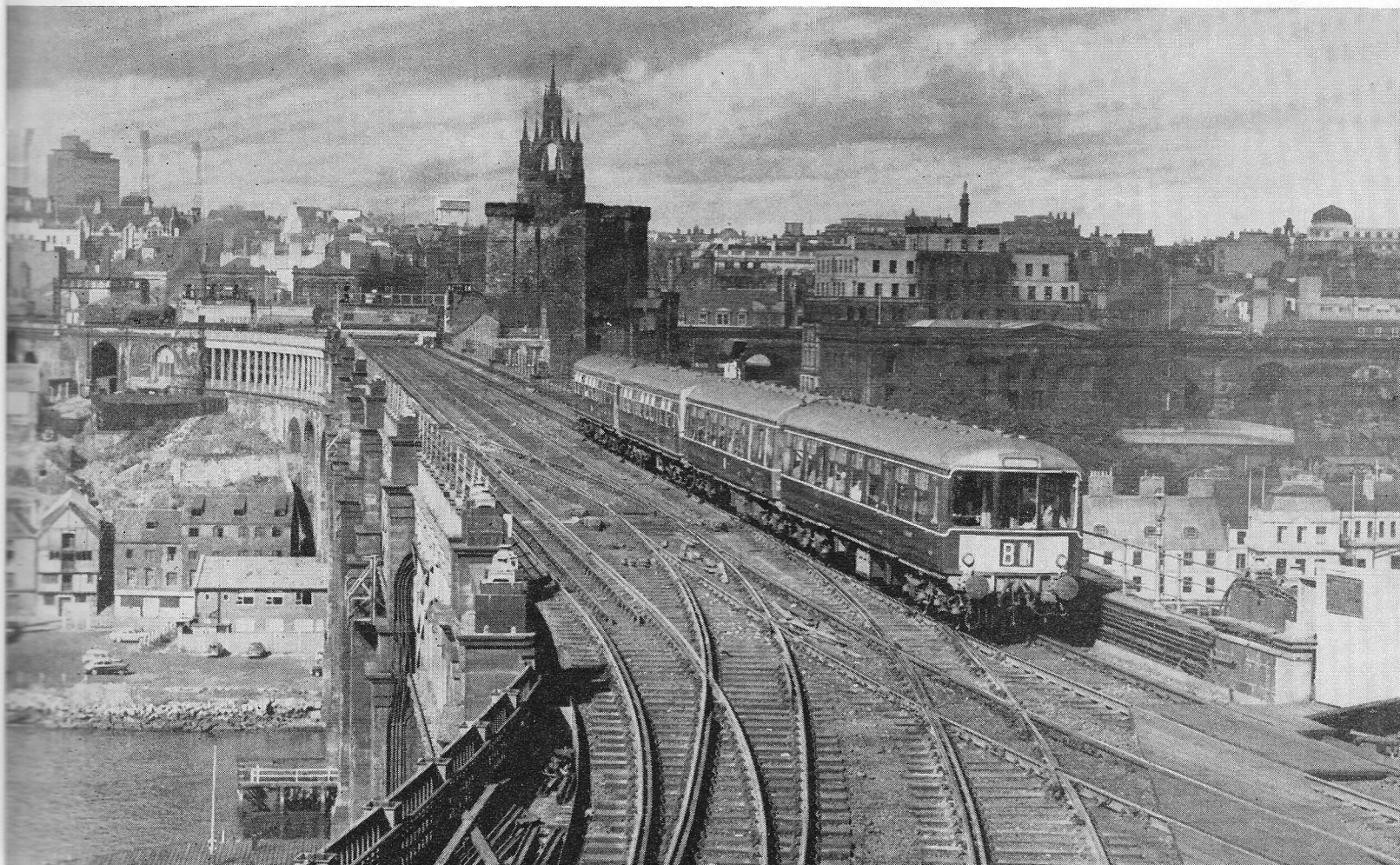
The Hon. Treasurer,
Longmoor Garrison Church
Memorial Fund,
*Transportation Centre,
Royal Engineers,
Longmoor Camp,
Liss, Hampshire.
*after July 15, 1965, at
School of Transport,
Longmoor Camp,
Liss, Hampshire.

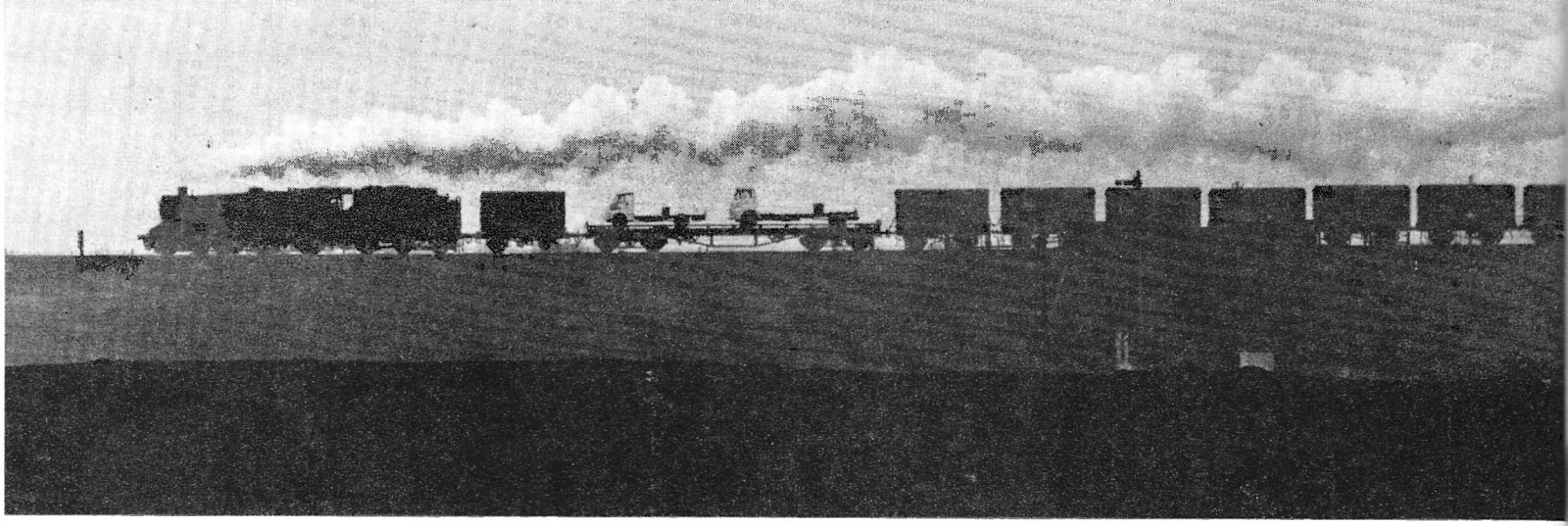
focus

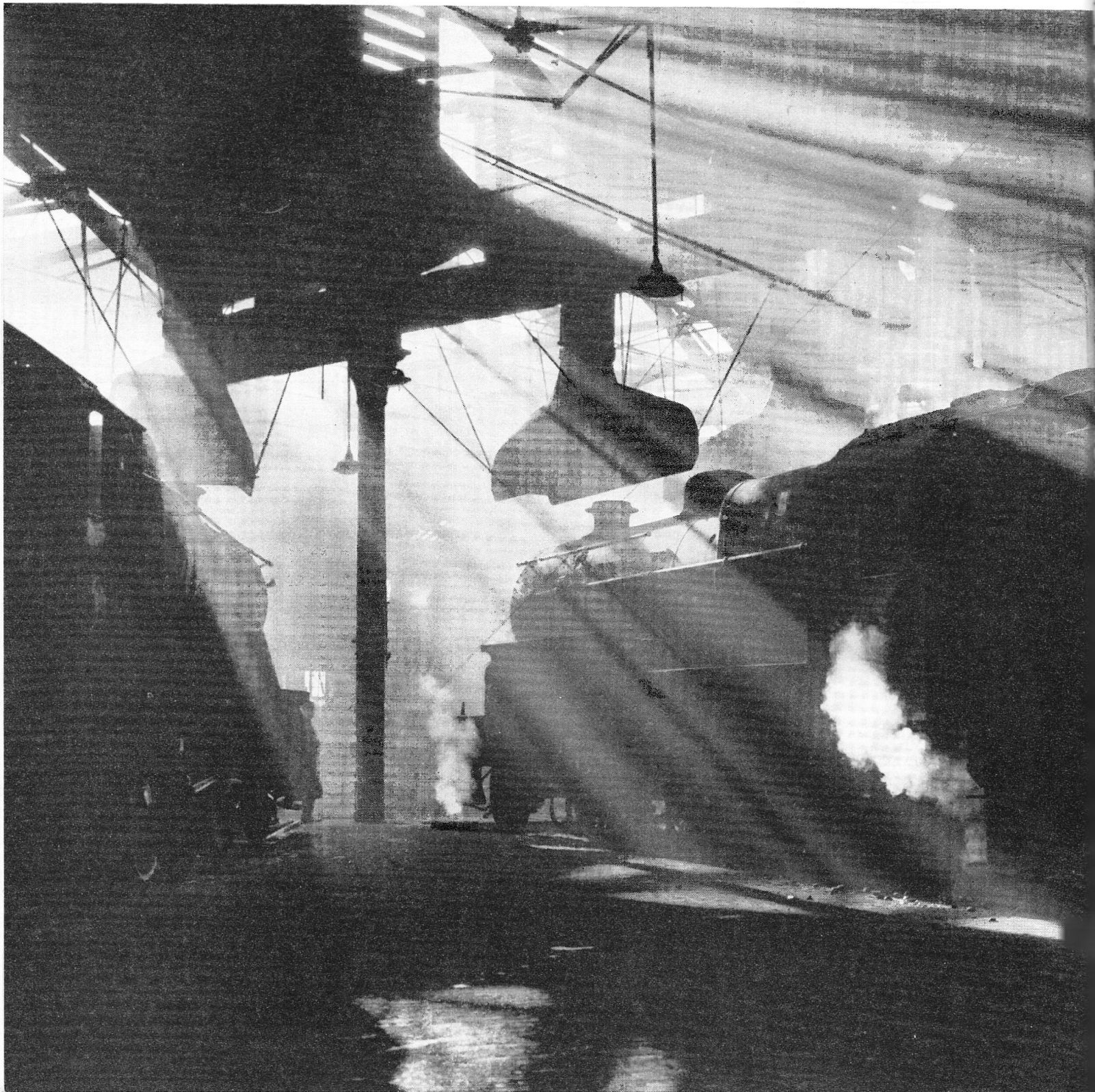
on DECLINE OF STEAM, Colin Gifford's new photographic album, which is reviewed on page 240. These three pages are excerpts from it.

Above: English Electric Type 4 diesel No. D253 and Class V2 2-6-2 No. 60875 at the north end of York station.

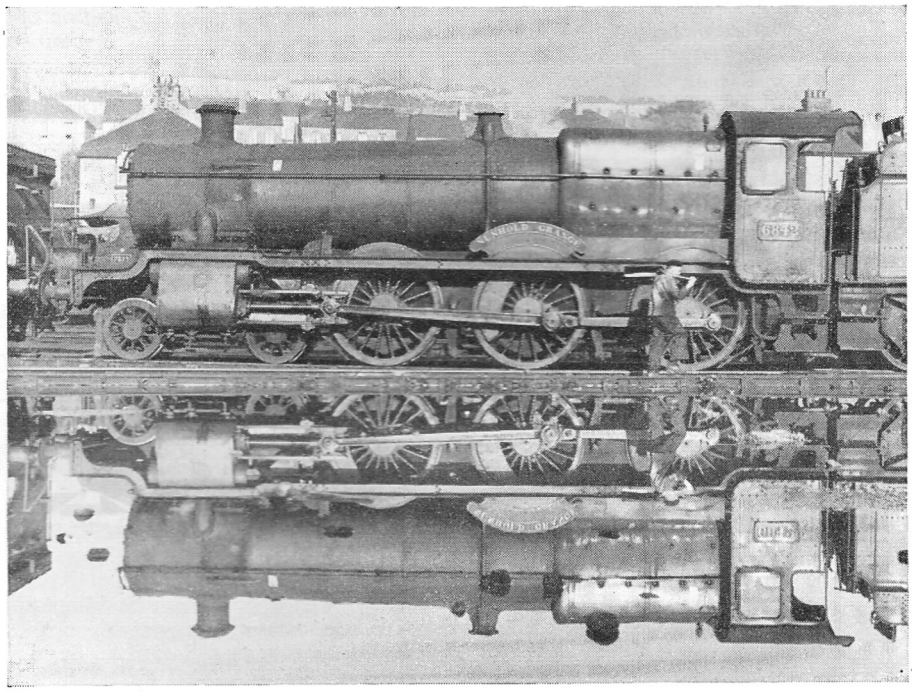
Below: A diesel multiple-unit of mixed Metro-Cammell and Birmingham RCW two-car units crosses the High Level Bridge at Newcastle.







Focus on
DECLINE of STEAM
by Colin Gifford
Concluded



Above left: A Class 5 4-6-0 and freight near Oakenshaw, south of Normanton.

Above right: A Class Q6 0-8-0 and one of the third-rail electric multiple-units now replaced by diesel multiple-units at Tyne Dock, NER.

Below left: The Holbeck shed roundhouse, Leeds.

Right: Reflections at Laira shed, Plymouth, before its dieselisation.

What future for computers in railway signalling?

"DO it by computer" seems to be rapidly superseding "Do it yourself" as a catchphrase of modern society. Ministers of the Crown, MPs and newspaper science correspondents invoke the computer with a mixture of hope and deference similar to that with which a more pious age sought the help of Providence in its problems. The nation is rebuked one day because it has too few computers, and the next because it buys too many from America. It is comparatively rare, however, for an authoritative voice to explain all that is involved in applying a computer to a particular task, and in deciding whether it is the best tool to accomplish it. Such a survey in respect of railway signalling has now been given by Mr. L. Hix, Assistant Director of Electrical Research, British Railways Research Department, in a recent paper entitled "The Place of Computers in Signalling" to the Institution of Railway Signal Engineers.

Railwaymen were using mechanical "logic"—the signalbox locking frame—long before electronic devices could decide whether the conditions had been fulfilled to allow a certain action to be undertaken. Sometimes it is claimed that a locking frame is a mechanical computer, but Mr. Hix showed that this is not so. The locking frame is a "calculator", not a computer. The "calculation" is done mechanically and is digital, being concerned with "two-state" information, such as whether signals are "on" or "off" and points "normal" or "reversed". It is only if the signalman is included that the calculator becomes a computer, for the signalman selects the combination appropriate to the conditions The signalman operates the calculator and does the computing himself. Could he be aided by, or replaced by a computer?

Can a computer equal a signalman?

Where trains run to timetable the problem would simply be one of engineering a system based on the train describer or a coding device on the train. When deviations have to be allowed for, however, Mr. Hix considers it an open question whether all the circumstances of which a signalman is aware could be fed into the computer in such a way as to equal or to improve on the signalman's performance. Judgment of train performance, effects of adverse weather, loss of adhesion, platform delays and other factors are intractable so far as a computer is concerned, until such time as they can be expressed as a computer input.

The paper illustrates a junction (not specified, but identifiable as Borough Market) which could be controlled by a computer having some 150 input and output connections and a programme of 18 pre-set route patterns. It is considered that there are as yet no grounds for incorporating safety interlocking in the computing system. If train driving were automated, the troubles arising from most, if not all, of the factors which make automation of the signalman's function so difficult would be overcome.

In computing it pays to "think big". In America the concept has been developed of bringing all the computing work of a railway system into one central installation. Already it is necessary to consider how a computing system developed for signalling and train control might be made to fit into such a "total information" system. Mr. Hix sees a pointer in the methods now being installed in some steelworks and aircraft factories, where commercial transactions and plant control are served by separate local computers which are made to work in harmony by fewer, larger computers, these in turn being supervised by a central computer.

New layouts could be tested for snags

Another application of the computer that is of interest to the signal engineer is as a simulator of a situation which can be expressed in mathematical terms. Simulation is needed when the mental picture created by calculations, graphs or drawings is too complex to understand, and this point may be reached by a centralised traffic control scheme for high-density routes, or a large marshalling yard. New signalling layouts might be tested in this way, showing up bottlenecks, their maximum throughput with and without changes, and where they would shift to if the situation were eased at the point being studied. A realistic simulation of all the variables involved in train running might involve a mass of data too cumbersome for a general-purpose computer and require one built for the purpose.

If a computing system to automate the driver's or signalman's function is to be evolved, devices will have to be developed to pass information direct to the computer with every significant change of conditions, instead of recording data first on tape and passing it thence into the computer through a tape reader. Such information could be obtained from the electrical safety interlocking and from train describer circuits without much difficulty. A problem of much greater magnitude arises if information has to pass to and from the train itself. Even if no more is required than one-way transmission of the headcode from the train, the complexities can be judged by the money and effort already spent by British Railways and by American and European administrations on an automatic wagon recording system.

Better communications would be needed

Much of the information required by the computer would have to travel some way over telecommunication circuits, and in a form which the computer can accept. This rules out the telephone messages of conventional train control. Moreover, it is not certain whether the telephone networks the railways have built up for such purposes will be able to handle information transmitted in the form the computer requires, and at a speed which would keep it usefully employed. Mr. Hix warns of the risk that automation and the efficient use of computing techniques could be crippled by lack of suitable communication links.

On the subject of reliability, he does not consider that the Henley-on-Thames experiment in the use of electronics for safety interlocking has been operating long enough to confirm that a computer used in the manner outlined could be a sound, reliable investment. Henley is not a computer installation, but an application of "computer-like devices", and Mr. Hix agrees that on a small scale, such as is involved at Henley, devices of this kind are accepted without question. He quotes several other arguments for the computer based on current experience and practice in different spheres, and concludes that while caution is obviously necessary, the weight of evidence is against holding back on the score that computing equipment cannot be made reliable and safe.

The author's final comments are on the cost of computing, for no railway can be expected to pay for the equipment unless a profit will come from it. Such profit is likely to be derived from improved use of resources rather than reduction in manpower and it cannot be assessed until a scheme has been analysed and costed. So far this has not been done and so the cost of computing is not an argument against getting on with the study.

NEW WR WEEKEND FARE

A new weekend ticket—"Western Weekender"—is available from Paddington to 40 different stations until May 29, including Easter. It saves as much as 24s on a return journey to Bristol, 29s 6d to Cardiff and 46s to Plymouth. Passengers can travel from Paddington by any train after 23.30 on Friday night or at any time on Saturday. The return journey can be made on Saturday, Sunday or by trains arriving back at Paddington before 07.30 on Monday of the same weekend.

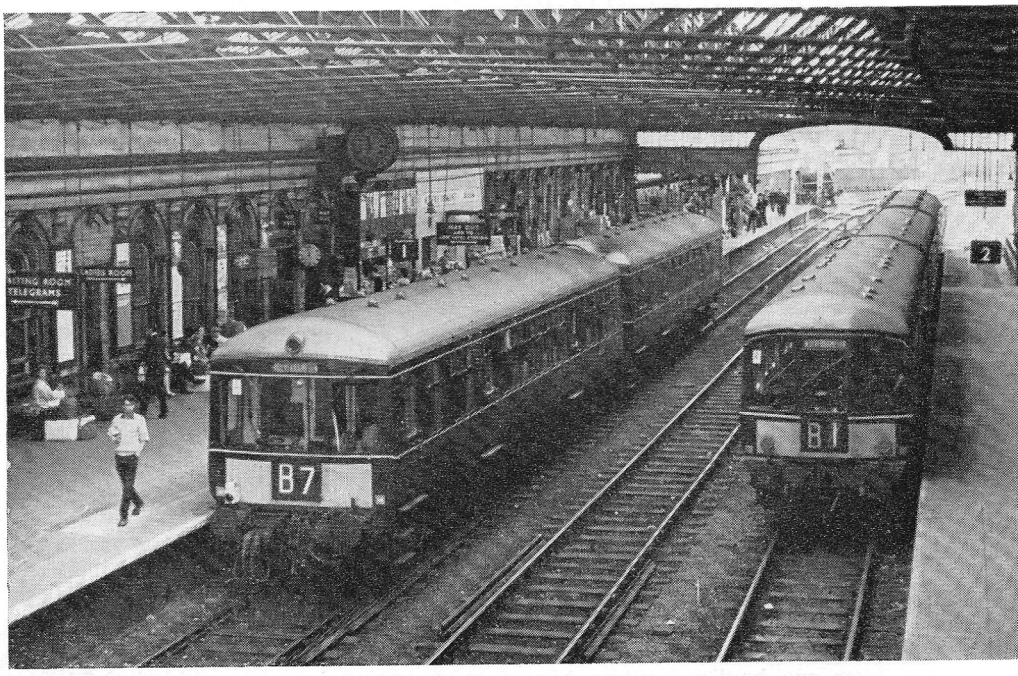
APRIL 1965

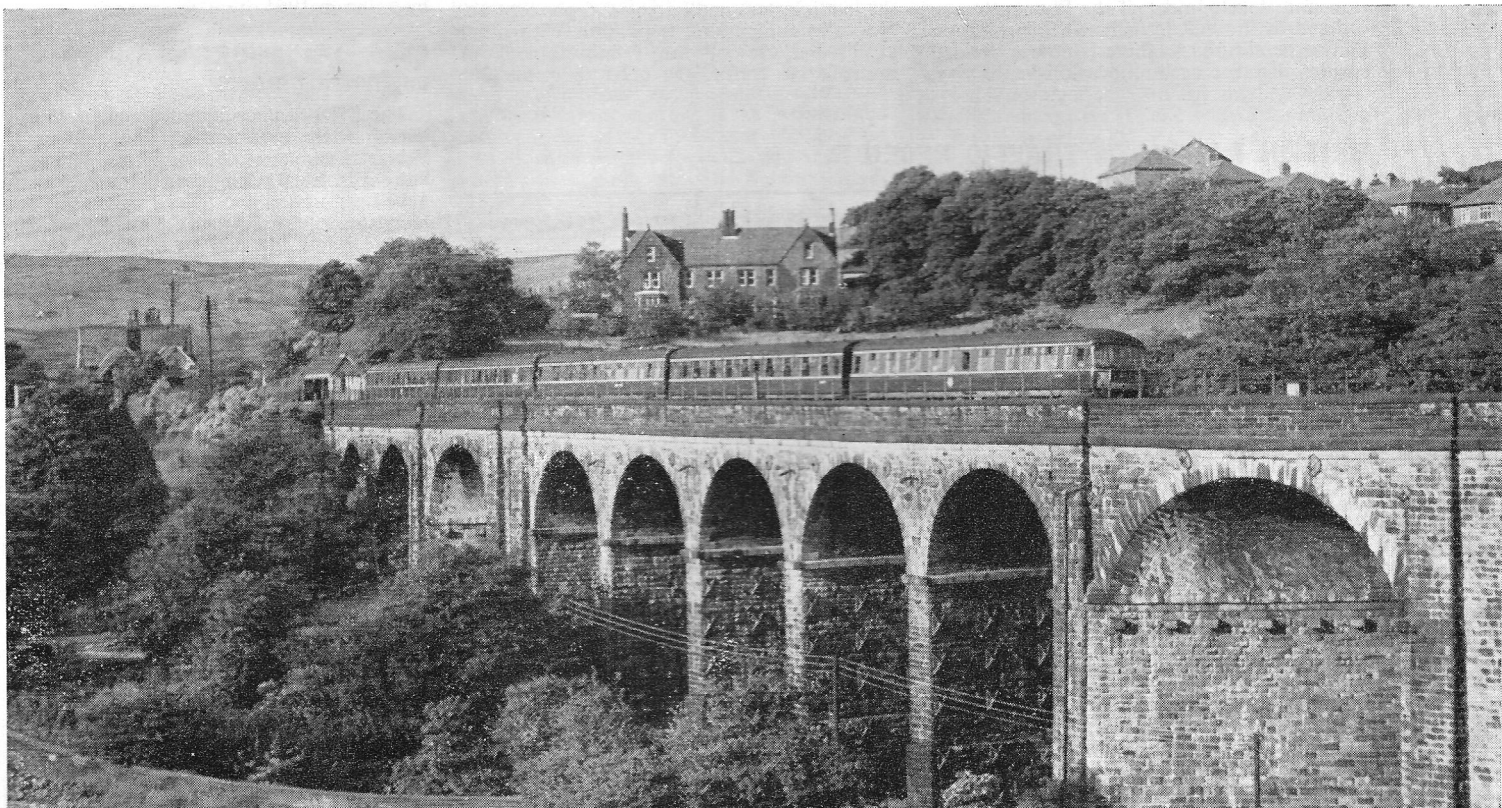
BRITISH RAILWAYS DIESEL MULTIPLE-UNITS

Top: A WR "Cross-country" three-car diesel multiple-unit forming the 13.05 Birmingham Snow Hill–Cardiff passes Tram Inn crossing, south of Hereford, on November 15, 1962. *Photo by A. A. Vickers*

Centre: Gloucester three-car diesel multiple-units at Wolverhampton High Level on August 28, 1964. *Photo by A. J. Wheeler*

Below: The 18.10 Leeds City–Liverpool Lime Street "Trans-Pennine" diesel multiple-unit crosses Saddleworth Viaduct on the descent from Standedge Tunnel on July 12, 1964. *Photo by I. G. Holt*





today and tomorrow

The Scottish Region has formally proposed closure of Edinburgh's Princes Street station (*see page* 233); it is seen here on June 20, 1964, with Class 4 2-6-4T No. 42058 heading the 11.30 to Manchester. *Photo by W. S. Sellar*

WR SEEKS ABOLITION OF PLYMOUTH DIVISION

A NEW storm broke over BR in the West Country late in February when a local newspaper reported that the WR was about to dismantle its Plymouth Division. In fact, a plan to amalgamate the Plymouth and Bristol Divisions had by that date only just been submitted to joint consultation. The WR's inclination to reduce its Divisional HQ from four to three—London, Cardiff and Bristol—has been known for some time. Already a good deal of the Plymouth Division's accountancy work is carried out by the Bristol headquarters, which has a computer. Recent cost studies have proved that the maintenance of a large headquarters staff at Plymouth to administer a diminishing territory is altogether uneconomical. However, the WR has no intention of pulling out of the territory completely. As much administration as possible will be transferred to Bristol, but a strong commercial element, including sales and publicity staff, will remain in Plymouth. Naturally the residue will need less than the seven floors which the Divisional staff now occupy of the 10-storey office block adjoining North Road station. Opened only three years ago by Dr. Beeching himself, this building was part of the general modernisation and development of the Plymouth area ordered by the WR in its first Modernisation Plan expenditure. As there is now a decided surplus of office accommodation in the city, BR are likely to find difficulty in disposing of the redundant floors. The outcry at disclosure of the WR plan was probably the more shocked because the Division's lively management team has been so prolific of development ideas—witness the two-part MODERN RAILWAYS article on the Division of last June and July—that traders and public must have taken its long-term existence for granted. Moreover, many of the additional staff who were drafted to the area moved home—and in some cases had new houses built which are not yet finished; this, too, must have created an impression of permanency. A deputation of four local MPs visited the WR General Manager at Paddington on February 22 to discuss the position, but what transpired had not been disclosed at the time of going to press.

BR traffics in 1964

Last year ended with British Railways' total receipts at £466.1m, or 1.0 per cent up on the previous year's. Total freight receipts were £290.5m, or 0.4 per cent down. Coal class receipts were 5.4 per cent down, iron and steel 15.1 per cent up, "other" freight receipts (including mechandise) 2.1 per cent down (compared with 4.4 per cent down in the last quarter) and parcels 2.6 per cent up. No valid comparison is possible with other years, because of the relinquishment of unprofitable traffic, the need to quote fine rates to secure traffic, and considerable reductions in operating costs. Total passenger takings at £166.2m showed an increase over 1963 of 3.0 per cent. Revenue from season tickets was 11.4 per cent up; but that from full-fare tickets was 4.2 per cent up, which with a rise of 13.1 per cent in passenger journeys at full fares seems to point to better-loaded long-distance trains. Nevertheless, despite a 2.1 per cent rise in first-class receipts for the year, first-class passenger journeys were 2.2 per cent fewer and total passenger journeys 0.1 per cent fewer than in the previous year. The tonnage of iron and steel carried was 16.8 per cent up and that of "other" freight 4.7 per cent up—figures to be considered against the percentage changes in receipts mentioned above; coal tonnage fell by 2.9 per cent, but the working of coal class traffic probably showed the greatest economies. The remaining £9.4m receipts described as miscellaneous were derived from sources such as demurrage, provision of shunting services, seat reservations and platform tickets, and showed an increase of nearly 10 per cent. The Minister of Transport told a Commons questioner at the end of February that a preliminary assessment suggested the BRB had reduced its deficit by £10m in 1964.

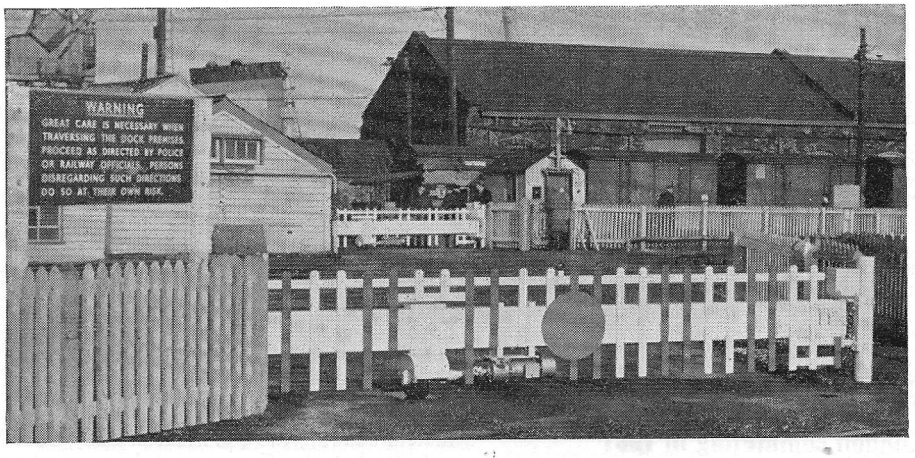
Changes in the BRB's engineering offices

The BRB has confirmed the changes in its headquarters organisation disclosed in the February MODERN RAILWAYS. The Mechanical and Electrical Engineering departments have been united and placed under Mr. J. F. Harrison, O.B.E., formerly Chief Mechanical Engineer and now designated Chief Engineer (Traction and Rolling Stock). Mr. S. B. Warder, the former Chief Electrical Engineer, has relinquished his post on secondment to UKRAS as Consultant in Railway Electrification. The Civil and the Signal & Telecommunications Engineering and the Architect's Departments have been grouped under the general direction of a Chief Engineer (Way & Works). This post is occupied by Mr. A. N. Butland, O.B.E., E.R.D., formerly Chief Civil Engineer. The nature of the responsibilities of these two posts differs in some respects. Whereas Mr. Harrison is head of a single department, Mr. Butland will manage the work of three separate departments, each of which will have a head who retains full professional responsibilities within his own sphere. Mr. A. Paterson, the Scottish Region Civil Engineer, has been appointed as BRB Civil Engineer under Mr. Butland. Mr. Butland will also co-ordinate planning in technical and in

BRITISH RAILWAY'S TRAFFIC RECEIPTS

	16 weeks to December 26		Aggregate for 52 weeks	
	£000's	compared with last year £000's	£000's	compared with last year £000's
PASSENGERS				
Ordinary				
Full fares	23,856	+ 901	82,199	+ 3,347
Reduced fares	14,703	− 375	53,093	− 1,612
Total ordinary	38,559	+ 526	135,292	+ 1,735
Season tickets	10,030	+ 1,136	30,938	+ 3,157
Total*	48,589	+ 1,662	166,230	+ 4,892
FREIGHT, PARCELS and MAILS				
Coal and coke	33,037	− 1,846	101,677	− 5,817
Iron and steel	12,285	+ 717	39,342	+ 5,148
Other	29,104	− 1,325	90,741	− 1,981
Parcels, etc. by coaching train	19,395	− 611	58,765	+ 1,474
Total freight	93,821	− 3,065	290,525	− 1,176
MISCELLANEOUS	2,871	+ 347	9,386	+ 843
TOTAL	145,281	− 1,056	466,141	+ 4,559

* The first class receipts included are £6,028,000 (+ £192,000, 3.3 per cent) for the 16 weeks and £18,753,000 (+ £380,000, 2.1 per cent) in aggregate.



The ER has adopted an NER design of boom gate for a difficult level crossing site at Parkeston Quay, Harwich, where nearby buildings and fences made installation of lifting barriers difficult. The gates, interlocked with the signalling, are electrically operated by a three-position switch mounted on a small pedestal unit in the nearby Parkeston West signalbox **(left)**. *Photos by British Railways*

other matters affecting the three departments. Both Mr. Butland and Mr. Harrison will, like the Chief of Research (Dr. S. Jones), report to Mr. John Ratter, the Board Member responsible for technical matters.

New Mirrlees engine for Brush diesels?

The re-equipment of BR's Brush main-line diesels with English Electric engines is not to be extended beyond the initial order for 50. It is understood that a new version of the original Mirrlees engine is being developed and that up to three will probably be fitted to Brush locomotives for a year or so's evaluation. If this proving is successful, this engine may be used for any further re-equipment of the Brush locomotives. A substantial measure of success has been achieved with the rehabilitation of the original Mirrlees engines that were starting to show housing cracks and there is growing confidence that the Brush diesels other than those to be modified with English Electric engines will give satisfactory service until tests of the new Mirrlees unit are complete. Re-engining of the NBL Type 2 diesel-electrics with Paxman Venturas has also been limited for the time being to the initial order for 20. In the remodelling the engine-room layout will be improved and some of the ancillary equipment modified to improve accessibility and facilitate maintenance. It is understood that a decision has not yet been reached whether the remaining 38 locomotives of this type will be required in the long-term BR traction plan. The first two of the five Brush Type 4 diesels, Nos. D1702-6, to be fitted with the 12-cylinder Sulzer V engine of Type LVA24 are expected to be ready for traffic shortly; they are to be allocated to Tinsley depot, Sheffield, for evaluation on intensive diagrams. The 2,800 h.p. Brush *Falcon* diesel electric prototype, with two high-speed Bristol-Siddeley-Maybach engines, has returned to BR service under a hire agreement whereby Brush will continue responsibility for major electrical maintenance; it retains its original number, D0280, but has been repainted in standard BR two-tone main-line diesel locomotive livery. The *Falcon* is expected to re-enter service on Paddington–Bristol diagrams; at the end of February it was allocated to Bristol Bath Road depot for crew training.

BRB takes air brake decision

The BRB has now ordered that no more vacuum-braked rolling stock will be built for BR. The operational problems of the transitional period are regarded as less formidable than they appeared at the time of the first post-modernisation plan consideration of future braking policy. Given an adequate supply of dual-braked diesel locomotives, marshalling yards should be able to provide fitted heads of whichever type of vehicle happens to be preponderant in the yard when the departure is being made up. With passenger stock the transition will be more troublesome. The operational inconvenience of rigid adherence to set train formations will have to be faced, or else a proportion of vehicles must be dual-fitted.

The Brush "Falcon" 2,800 h.p. diesel-electric prototype has returned to BR service under a hire agreement (*see this page*). It has been repainted in the standard BR two-tone green livery for main-line diesel locomotives.

Unions again reject BRB proposals

The BRB has had two more rebuffs on the key issues over which it is currently trying to secure union co-operation. Despite the wider guarantees against redundancy, the NUR has re-affirmed its opposition to the "free terminal" concept for operation of Liner trains and Roadrailers. The NUR has also refused to agree to the guards of such trains riding on the locomotive instead of in a separate brake-van, regarding this proposal as the thin end of the wedge to eliminate goods train guards altogether. ASLEF, the footplatemen's union, has rejected BRB proposals for a national bonus scheme as part of a new agreement that will allow more single-manning. The BRB was seeking to abolish the present 100-mile and 75-mile limits for single-manning respectively, of passenger and freight trains, though it was agreeable to retention of the 3hr time-limit, and also wanted the union to agree to single-manning of non-brake-fitted freight trains. Additionally, it sought more flexibility in the timing of footplatemen's "physical needs" breaks, proposing that two short breaks at times suited to the roster should be substituted for a fixed 30min release from the locomotive between the third and fifth hours of a duty, and that the 8hr limit on a turn of duty should be capable of relaxation if necessary. If the BRB's proposals were agreed, footplate staff on BR might eventually be reduced by 10,000, with a saving of up to £7m annually. At the last meeting between ASLEF and the BRB, the union rejected the amounts of bonus payment proposed as inadequate and added that negotiations on this issue should be separated from those on single-manning. According to some reports, however, the union may still be prepared to discuss a package deal if the size of the BRB's bonus offer is increased. There is concern in the union that incentive bonus schemes in other railway grades are cutting the footplatemen's "craft differential"; as a result, it is alleged, some Midlands drivers have voluntarily transferred to freight train work because of higher rewards in this job under local productivity bonus schemes.

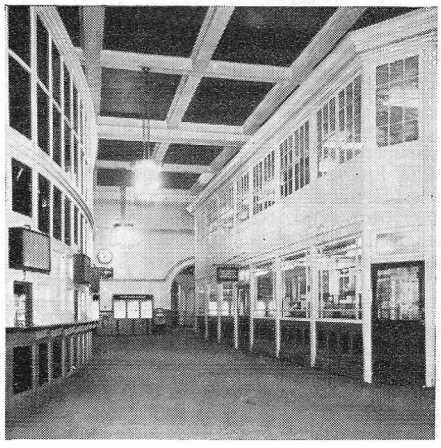
The new London off-peak fares

The BRB implemented the Transport Tribunal's recently authorised withdrawal of day return fares in the London Passenger Transport Area from Sunday, February 28. Existing cheap fares, including the five-day off-peak ticket and—apparently without advance warning—shopping tickets, were replaced by new day off-peak fares. These

are available for the first time on Saturdays and Sundays as well as Mondays to Fridays. They cost less than the previous day returns and are cheaper than ordinary fares by amounts ranging from about 5 per cent for a journey of 10 miles to close on 40 per cent for 40 miles, but they are dearer than the off-peak tickets offered before February 28. The new tickets are available between any two BR stations 10 miles or more apart. Mondays to Fridays they can be used by any train after 9.30 except those starting from London between 16.30 and 18.30. On Saturdays and Sundays there are no time restrictions at all. The off-peak fares are not available on the Fenchurch Street–Upminster line because its fares are already below those charged elsewhere on BR.

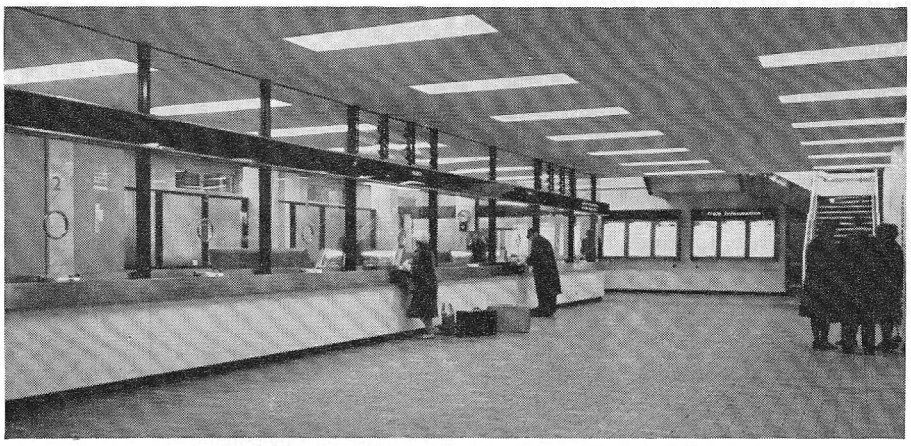
London commuting in 1981

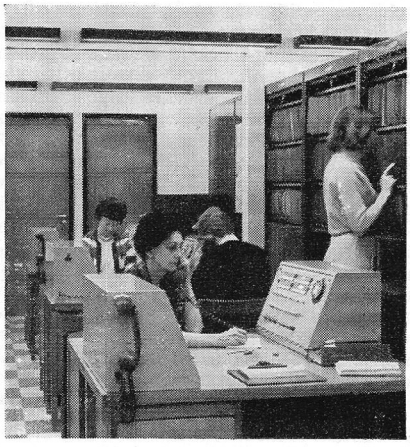
Approximately 1.2m people entered Central London daily during the three hours of the morning peak period in 1964, an increase of 8 per cent compared with 1954. Approximately 74 per cent came by rail (41 per cent by BR and 33 per cent by LT), 16 per cent by bus and 10 per cent by private transport. During the 10 years between 1954 and 1964, the number of passengers brought into the area by bus declined by 30 per cent, the number by BR increased by a quarter, while those conveyed by LT railways went up 7 per cent. In the same period private car commuters increased by over 75 per cent, but they still amounted to no more than 8 per cent of the total commuter movement. With these statistics of the present situation Mr. Anthony Bull, member of the LT Board, opened a preview of London's future transport to the Western Region Lecture and Debating Society in February last. Until recently, he went on, it had been thought that by 1981 there would be 400,000 more commuters entering the conurbation daily from outside, but the Government ban on new office accommodation in the Central London area, combined with other factors, now seemed likely to cut the probable additional flow in 15 years' time to 250,000 daily. Most of this increase would have to be handled by BR services, almost all of it from outside the built-up area. Mr. Bull said that studies by the Regions of BR had shown that up to 400,000 more commuters could be handled with the provision of additional tracks at critical points, the installation or completion of electrification where traffic density justified it, by lengthening additional trains and introducing more, and by timetable remodelling. However, about £100m might be needed to carry out these improvements. The future distribution of the demand should be most carefully planned, bearing in mind that it would be relatively easy to provide extra public transport in some sectors, but that this could be achieved only with great difficulty and enormous expense, which would fall on the community elsewhere. In addition to distributing commuters from the main-line termini, underground railways should also replace BR services in the inner suburban areas where road services were impracticable, so as to free BR track capacity for outer suburban services. One of the bus's principal



LIVERPOOL STREET FACE-LIFT COMPLETE

The Liverpool Street station face-lift, which in the past year has seen the provision of a new booking hall, main-line ticket office, and enquiry and reservations office was completed in February with the opening of a new Continental travel office on a mezzanine floor above the central part of the booking hall. The illustrations show: **(above left)** the main-line booking hall prior to the start of reconstruction, with the ticket office on the left and the Continental ticket and information bureau on the right; **(centre left)** the new main-line booking hall, which is equipped with self-accounting ticket-issuing equipment comprising four Multiprinter machines, one Flexiprinter and two Handiprinters; **(centre right)** the telephone reservation section and **(bottom left)** the public booking and enquiry counter of the new Continental travel office, which is linked with the teleprinter office in Harwich House, on the other side of the station, by a facsimile system so that written enquiries about seat and berth reservations can be transmitted and a written reply received within a few minutes; **(bottom right)** the general enquiry counter of the new enquiry and reservations office, which combines two functions previously dealt with in separate offices on No. 9 platform. *Photos by British Railways*





roles would be to feed the outer BR and LT stations, but as the numbers and use of private cars would steadily increase in the outer areas, additional parking facilities would have to be provided at these stations on a much more extensive scale than hitherto envisaged. To enable the LT underground to fulfil its part, further extensions of the network would be necessary after completion of the Victoria Line (probably with an extension southwards from Victoria to Brixton, but possibly beyond). A new tube railway would probably be needed to run from Baker Street by way of the Strand and Fleet Street to the City and possibly over the East London railway to New Cross. To the north, this might take over the Stanmore branch of the Bakerloo Line, so as to increase Bakerloo capacity between Baker Street, Paddington and Queens Park. Beyond New Cross, said Mr. Bull, this line might be extended to take over one of the SR suburban services and thereby relieve the SR South Eastern Division between New Cross, Borough Market Junction and the Cannon Street and Charing Cross terminals. Other possibilities included the extension of the Aldwych Line to Waterloo, which might relieve the Bakerloo Line of sufficient traffic to enable the latter to be extended from Elephant & Castle towards Peckham. Schemes of this kind, together with other local improvements of the existing network, might cost £100–£150m at present-day price levels. But an expenditure of this order over perhaps 20 years ought to be viewed in relation to the expense of over £500m probably involved in extending the radial motorway system to within three or four miles of London's centre and in providing the necessary links between radial motorways. Mr. Bull reminded his audience that the Buchanan Report held "relatively cheap" public transport to be the key to maintenance of a ceiling on private car traffic in busy areas. In almost all other great cities of the world, public transport was assisted by central and/or local Government. The constructional costs of most city underground railways were met by public funds and the operators were required only to cover their current working expenses from passenger receipts. Mr. Bull pointed out that in Paris, if the city transport organisation would otherwise be in deficit, but an increase of fares was deemed socially undesirable, payments were made to it from public funds.

LMR appoints a Passenger Manager

The LMR has reorganised its headquarters Commercial Department. Dr. R. A. Taylor, lately Director of Traffic Survey at the BRB, takes over a new appointment as Passenger Manager, with responsibility for passenger marketing operations, passenger fares and passenger planning. Dr. Taylor, who is 36, was closely associated with the traffic studies dealt of the Reshaping Report, has been responsible for the development of BR market research and traffic surveys and has lately been involved in rail traffic planning for South-East England. Mr. J. C. Stewart, the LMR's Commercial Manager, will continue to be responsible for all Regional Commercial activities with regard to freight, as well as economic research and sales training.

Diesel depot for Saltley

The LMR is to build this year a new diesel locomotive servicing depot at Saltley, Birmingham. The installation will consist of a shed with three through pit roads; a small store and workshop will be incorporated in the structure so that minor repairs can be carried out, but major maintenance work in the area will be done at Tyseley diesel depot. The Saltley m.p.d. buildings at present housing 70 steam engines will be converted for use by other railway departments. Approximately 100 diesel-electric main-line locomotives and 20 diesel shunters will be dealt with at the new depot.

Northampton resignalling is finished

The resignalling of the Northampton loop was brought into commission during the weekend of February 13/14. This installation, which links up with the new signalling at Rugby, provides continuous track-circuiting and colour-light signals with AWS throughout. Of the eight former signalboxes, four have been abolished and four retained and modernised with illuminated track diagrams for electro-mechanical working. New relay rooms have been built adjacent to each signalbox to house the immunised miniature signalling relays, train describer and telecommunications equipment. A remote control system using mechanical reeds in conjunction with transistor amplifiers is used for the operation of and indication of outlying ground frames from Nos. 1 and 4 signalboxes and the emergency replacement of selected automatic signals. This system is also used to indicate on the signalbox illuminated diagrams the track circuits in the automatic area north and south of Northampton station (where rebuilding has begun). Where point machines are used for crossover layouts these are of the all-electric a.c. immune type, employing permanent magnet motors and fed from local transformer rectifier units. For emergency use, handcrank units adjacent to each layout are electrically released from No. 4 signalbox. The main contractors were SGE Signals Ltd.

Economics at Carlisle yard

To cut the wages bill, the automated Carlisle marshalling yard is being shut for the Saturday night–Sunday morning shift each week. The management rejects local NUR allegations that any freight transits will be protracted in consequence.

New Divisional offices at Preston

The new Preston Divisional offices, Ladywell House, housing the Preston Divisional HQ and other staff, are now occupied. The Preston Division of the LMR's North Western Lines was formed from part of the former East Lancashire Division in 1963, concurrently with a far-reaching management reorganisation; the staff were then located at Preston, Manchester, Bolton and Accrington. Since it was essential that all the Divisional Manager's staff be together and since no suitable alternative was available, a three-storey block was specially built. Ladywell House accommodates the Divisional Manager's operating, commercial, and technical staffs, and also those of the associated technical departments of the District Engineer, District Estate Surveyor and Signal & Telecommunications Engineer.

First LMR Anglo-Irish car ferry launched

A hint that BR might soon order more ships from British builders was given by Dr. Beeching after the launch of the twin-screw turbine car ferry *Holyhead Ferry I*, 3,800 gross registered tons (*see March issue*, p. 132), by Mrs. Sean Lemass, wife of the Prime Minister of the Irish Republic, at the Hebburn (Tyneside) yard of Hawthorn Leslie (Shipbuilders) Ltd on February 17. BR's other guests from Ireland at the launch included Mr. Erskine Childers, Minister for Transport & Power, also Dr. C. S. Andrews, Chairman, and Mr. Frank Lemass, General Manager, of CIE. Proposing the toast of the builders at dinner that evening, Mr. H. C. Johnson, Chairman & General Manager of the London Midland Region, pointed out that all July sailings from Holyhead of the *Holyhead Ferry I*, which enters service on July 9, were now fully booked, and so were sailings on many dates in August. Since advertising for the service had been started early this year, more than 16,000 firm bookings for vehicles by this ship had been made and enquiries were coming in daily. The ship's name had been chosen to identify the vessel with the service and to indicate the future intentions of the BRB. The ship will accommodate 150 cars (or motor-coach equivalents on the main car deck) on two decks, including 25 on the forward upper deck, access to which will be by hydraulically-lifted ramps. Passenger complement is 1,000 and accommodation includes a self-service restaurant seating 228. Overall length is 369ft and breadth 57ft. Equipment includes fin stabilisers, twin stern rudders and bow rudders, and a sidethrust unit for berthing and manoeuvring in harbour. Service speed will be 19½ knots and the schedule for the journey between Holyhead and Dun Laoghaire is to be 3hr 15min, with two voyages each way daily during the peak.

Broad Street-Richmond Line economies

At the end of February the LMR announced that it was not proposing to make any closure proposal for the Broad Street–Richmond Line until further studies into the viability of the service were completed in a few months' time—but in any event closure was not inevitable. Meanwhile further steps have been taken to improve the line's economics. From March 7 four stations —Canonbury, Caledonian Road & Barnsbury, Kentish Town West and South Acton —were closed permanently on Sundays and from March 1 South Acton station was closed at 21.00 each weekday. A revised Sunday service introduced on March 7, although maintaining the existing half-hour interval, has been accelerated by 4–5min and cuts from four to three the number of trains needed to operate the service. From April 18 an augmented spring and summer Sunday timetable will operate with a 15min service over a longer period of the day; more cuts in journey time will allow the service to be operated with only six trains instead of the seven needed last year. The LMR stresses that while the closing of the four stations on Sundays may cause some inconvenience to a small number of travellers, stations on the Broad Street–Richmond Line are a comparatively short distance apart, and other stations will be open within about half-mile of each of the four closed.

Scottish closures

The Scottish Region has announced a formal proposal for the closure of Edinburgh Princes Street Station from April 5 and the cessation of all passenger services between Slateford Junction and the terminus. In mid-February the Minister of Transport consented to the withdrawal of passenger services between Leven and St. Andrews, subject to the provision of additional bus services between Leven and Crail and satisfactory bus-rail interchange arrangements at Leven, to the termination of passenger services between Dumfries and Kirkcudbright, and Castle Douglas and Kirkcudbright, again with the proviso that additional bus services must be put on, and to the closure of Dundee West station. The Scottish Region has fulfilled its threat to withdraw the Sunday "Blue train" electric services on the Neilston branch because of lack of patronage. This was effected on March 7 and from the same date the remaining Glasgow South Side electric stations were made unstaffed on Sundays; tickets are now issued on the trains by travelling ticket collectors.

Tay Bridge gets first overhaul

After nearly 80 years continuous service, the Tay Bridge is undergoing its first major overhaul. Renewal of the bridge's massive expansion bearings—a 12-year undertaking—has been finished and engineers then began to replace sections of the trough flooring which carries the permanent way. The bridge consists of 72 spans of deck girder construction and, over the navigation channel, 13 high spans of through girder construction. The girders rest on wrought-iron piers founded on iron cylinders sunk into the sand of the river bed and filled with concrete. Renewal of the expansion bearings was started in 1952, but as the engineers could have possession of the busy bridge only for short periods at weekends, this was a prolonged operation. The old bearings were of the "rocker" type, in which the girder rested on curved bearing surfaces; this permitted longitudinal movement according to temperature, but the design did not allow for contraction as well as expansion and as a result the rocker units seized up. These bearings were large—some weighed over four tons—and located in extremely awkward situations. The replacement bearings, of welded steel construction, have been designed to take into account both the deflection of the girder under load and the longitudinal expansion and contraction. The sliding surfaces are of phosphor bronze. Provision has been made for frequent greasing. Renewal of the bearings has involved cutting out the old trough decking over the piers and fixing special brackets on to the girders to position hydraulic jacks capable of giving a 300-ton lift and taking the weight while the new bearings were slipped in. Moving out the old bearings and placing the new ones was a delicate operation requiring few men, but a great deal of effort and not a little danger to the engineers working in and around these heavy loads in such confined circumstances. On the high girder spans it took a period of about 7hr at a weekend to place one bearing. On the high spans work was greatly simplified by the provision of purpose-made travelling stages which will remain there for future use in maintenance and painting. The replacement of sections of the bridge decking is carried out by cutting out a short stretch of the troughing, inserting a shaped replacement piece to suit and welding up anew. The work is slow and extremely tedious and it is estimated there are about 18,000 parts of troughing to be so treated. The whole operation is expected to take five years to complete, at a cost of £350,000. To renew the deck throughout would cost £1m. In addition, in the same period, some £150,000 will be spent on an intensified painting programme. This heavy expenditure—£100,000 p.a. for five years—will, with modern paints and methods of application, extend the painting and minor repairs cycle from four years to eight or possibly more.

Glasgow commuter quiz

As part of the Greater Glasgow Transportation Study, the Scottish Region conducted a postcard survey of travelling habits at stations in and around Glasgow on the last week of February. Prepaid and addressed postcards were handed to passengers travelling to and from the city to discover facts about the starting points and destination of their journeys. This information will be used by the Transportation Study Group in the larger and more detailed analysis now being made of travel habits and land use in the Glasgow conurbation. The Greater Glasgow Transportation Study was begun in August last year and will take three years to complete. It is sponsored by Glasgow Corporation and other local authorities on Clydeside, and by BR and the Scottish Bus Group. The postcard questionnaire seeks particulars of the railway journeys made, including the type of ticket used, the reason for the journey and the method of getting to and from the station. Passengers are also asked to co-operate by giving details of personal transport available to their households. It was one of a large number of surveys being organised by the Study Group.

Minister refuses East Lincs closure

The Minister of Transport has refused to sanction the withdrawal of passenger services between Peterborough North and Grimsby Town and from the associated Firsby–Skegness and Willoughby–Mablethorpe branches. The Ministerial statement conceded that these services were uneconomic, but required the BRB to reconsider their closure proposals; thereafter, withdrawal of some parts of the area's train service might be possible. The vagueness of the statement has not allayed local fears. Meanwhile the new spur at Newark, designed to carry, amongst other traffic, re-routed Grimsby–King's Cross trains via Barnetby, has been laid in, together with a new down loop, and some of its associated colour-light signalling came into use on February 22. It was expected that High Dyke–Scunthorpe iron ore traffic would start to take this route during March. The reduction of traffic on the Peterborough–Grimsby line should allow one shift of work on this route to be eliminated.

North Eastern closures

The Minister of Transport has authorised the withdrawal of local passenger services between Bradford and Huddersfield, which involves the end of all services between Low Moor and Mirfield and between Selby and Driffield via Market Weighton. From March 22 the NER withdrew local passenger services between: Leeds City and Bradford Forster Square via Shipley; Leeds City, Bradford Forster Square and Skipton; Leeds City, Bradford Forster Square and Skipton; Leeds City and Ilkley via Arthington; and Ilkley and Skipton. Through services continue to operate between Leeds and Skipton and beyond, calling at Shipley, Bingley and Keighley, and connecting services are retained between Bradford Forster Square and Keighley. In these economies, 17 stations have lost their regular passenger services. Passenger services between Bishop Auckland and Crook were withdrawn from March 8. The Conservative MP for Scarborough and Whitby, Sir Alec Spearman, has fulfilled his pledge to table a private members' bill that would secure the reprieve of the threatened passenger services to Whitby. A further development in this area is the formation of a syndicate by six Whitby men to take over the York–Whitby passenger service.

Western and Southern closures

Two WR proposals for passenger service withdrawals have been agreed by the Minister of Transport. One affects trains between Barnstaple Junction and Torrington, but the Minister has stipulated that these must not be taken off until October 1 and that additional bus services must be provided in the area. The other proposal affects the former rail services in the Bristol area between Filton Junction and St. Andrews Road via Henbury and between Severn Beach and Pilning Low Level. With the Minister's authorisation, these were withdrawn on November 23, but the additional bus services put on in substitution have been poorly patronised; the Minister has now given his consent to their withdrawal. The West Drayton–Staines West passenger service is to be withdrawn on March 29. Closure of the SR's Heathfield branch between Eridge and Hailsham and the Cranleigh branch between Christs Hospital and Guildford has been approved by the Minister of Transport; the probable closure date is June 14.

Bristol station to have a bowling alley

Development is to transform one of Bristol's suburban stations. A 1½-acre site at Clifton Down, largely comprising the station's redundant goods yard, is the focus of the scheme, but a large area of the station platforms is also to be decked over. The principal features of the development project are a multi-storey car park, with room for over 200 cars, a bowling alley and a precinct for offices and 19 shops.

Changes at Reading

From March 1 the WR took over control of Reading Southern station; both Southern and General stations are now under the supervision of the Reading General station-master, Mr. J. F. Snow, who has been re-designated Station Manager. The fully mechanised ticket office and new enquiry office now under construction at Reading General should be finished by the end of April; therafter it will cater for the traffic at both stations. A new passageway is being provided for passenger movement between the two stations. The new Reading power signalbox is to be commissioned on April 25. This is the main stage of a £2m resignalling scheme covering the three approach routes from the West to Reading, which should be complete by the end of May. The limits of the scheme are Uffington on the Bristol line, Theale on the West of England line, and Bramley on the Basingstoke line. The section of line from Didcot to just south of Oxford is also included.

New Continental terminal at Stratford, ER

Stratford has been selected as the site of the ER's new London Continental freight terminal, expected to cost over £1m, and detailed planning of the project has begun. If authorised, the new depot could be in operation towards the end of next year. Covering some 30 acres of BR land, the terminal would replace the Continental facilities at Bishopsgate goods depot, destroyed by fire in December last year. An adjacent Liner train depot is also planned.

SR anti-litter drive

In February the SR launched a new anti-train-litter drive on the London–Hastings line. Litter bins have been placed at the ticket barriers of all stations on the London–Hastings line and advertisements have been posted in the diesel-electric multiple-units urging passengers to use them instead of strewing the train with litter. Litter bins cannot be provided in every compartment, according to the SR, "because of the restricted space and the risk of fire when people use them as ashtrays. Even if it were practicable the cost would be prohibitive and the bins, like most train fittings, would be an obvious target for increased vandalism. In the newest stock bins are provided at each end of corridor coaches but experience has shown that they are little used. We are now providing litter bins where passengers do not have to make a special journey in order to get rid of their litter—the point where they leave the platform".

WR's GM no sitting target

The Western Region's London area suburban service has undergone some bitter local criticism since it was recast last September. But it is not thought officially that this can be linked with an incident on February 10 when shots were fired at a London commuter train, even though its passengers included the Region's Chairman and General Manager.

beyond the Channel

Edited by Paul Drew

WESTERN GERMANY

Motive power changes

DURING the 14 months from January 1, 1964, the DB fleet of electric locomotives increased from 1,530 to 1,750. Concentration of traffic, notably long-haul freight, on trunk lines recently electrified or nearing electrification, such as the main route from Hamburg and Bremen via Hanover and Fulda to Frankfurt and the South, continues to create a need for main-line electric locomotives. The number of line diesel locomotives rose by about 100 to 1,800, and that of steam locomotives in service fell from 5,800 to about 5,000, of which the more powerful freight and passenger types tend to be allocated to the Divisions embracing non-electrified main lines in the northern plains, such as Hamburg, Hanover, Münster, Essen and Cologne, although large main-line steam locomotives are still at work almost throughout the system.

Electric train heating for diesels

With the spread of electrification and hence of electrical train-heating on coaching stock, the German Federal is starting trials of suitable equipment on its diesel locomotives. Four new locomotives of the 1,900 h.p. Class V160 are to be fitted with 500 h.p., 360kW diesel-generator sets, which will increase their weight from 75 to 80 *tonnes*. They will be designated Class V162. An additional hydraulic converter is being fitted to these diesel-hydraulics so that the power of the diesel-generator set can be utilised for traction when the V162s are employed on freight haulage.

SWITZERLAND

New Bernina motorcoaches

In October last the Rhaetian Railway put into service six new motor-coaches to work over its metre-gauge Bernina line between St. Moritz and Tirano. Originally an independent company, the Bernina Railway from its opening in 1908 was equipped for working with current at 1,000V d.c., as compared with the Rhaetian main line 11,000V a.c., and the former thus has always required its own independent motive power. The new motor-coaches are generally similar to those introduced in 1957 and 1958 by the Rhaetian Railway on the Chur-Arosa line, which also uses d.c., but at 2,000V. They are 54ft 3in long over buffers, and have two first-class compartments seating 12, three second class with 24 seats, and large central vestibule with two seats and a lavatory, all much more spacious than the previous stock; each car weighs 42½ tons, has all four axles motor-driven and is of 900 h.p., and can traverse curves of a radius down to 150ft. The Bernina line has several notable features; it climbs nearly 6,000ft from Tirano to its summit level of 7,410ft at the Bernina Hospice—the highest altitude reached by any through railway in Europe. Moreover, with its continuous 1 in 14 gradients it is one of the two steepest lines in Switzerland worked by adhesion. Because of this steepness, special attention has been paid to braking with the new cars; the equipment comprises hand-brake, air brake, regenerative electric braking, electric resistance braking, and magnetically-operated rail-brakes. In view of the gradients, notwithstanding the lightness of the rolling stock two motor-coaches have hitherto been needed on all but the lightest trains (and without multiple-unit operation), but the new and more powerful motor-coaches will be capable of handling several trailers without assistance, which should make possible considerable economies. Their maximum rated speed is 40 m.p.h.

New 6,240 h.p. locomotive for BLS

The first of two prototype rectifier Bo-Bo locomotives was delivered to the Berne–Lotschberg–Simplon Railway in December. Subsequent trials have had most satisfactory results. The 80-ton tare weight is the same as that of older 4,000 h.p. locomotives of the same class, eight of which are in the service of the BLS. Capable of working 600-ton trains up the 1 in 37½ gradients at 47 m.p.h. the performance of the new locomotive has proved to be about 50 per cent higher than that of the existing Ae 4/4 class Bo-Bo locomotives, which can haul only 400 tons at that speed up these gradients. The new locomotives therefore equal in power the six-axle locomotive of older construction, weighing 120–140 tons.

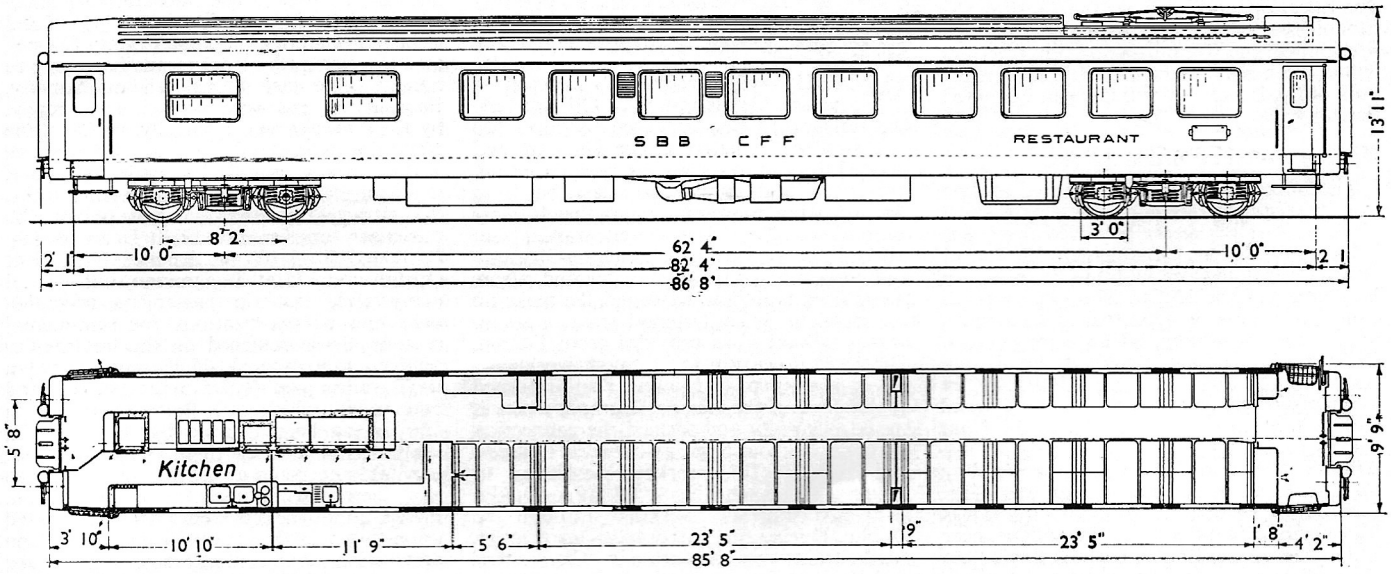
FRANCE

French m.us. displaced from TEEs

With the TEE "Paris–Ruhr" taken over from May 30 by a German diesel TEE train, which in turn is released from the "Helvetia" by introduction of new locomotive-hauled sets, the last of the original French TEE sets will be withdrawn from TEE service, writes J. H. Price. They are to be used for "Le Catalan" (Geneva–Port Bou) and presumably will be repainted in the SNCF standard green for long-distance diesel trains. They will displace RGP diesels which apparently are to work the Lyons–Clermont–Bordeaux trains, BS/SB, and release others which will be used for a new evening Nantes–Bordeaux and Bordeaux–Nantes diesel service, to start at the end of June.

Marshalling yards

Marshalling is being concentrated on a few mechanised yards. Woippy (Metz) yard was placed in service last year and good progress is reported on new yards at Dunkirk, Hourcade (Bordeaux), Sotteville (Rouen), which is associated with the Paris–Rouen–Havre electrification, and Sibelin (south of Lyons). Completion of these yards will make possible a far-reaching modification of freight train



The Swiss Federal Railway is ordering from Swiss firms 10 new restaurant cars for its services between Basle or Lausanne and Milan, on which the cars are managed by the Wagons-Lits Co. (restaurant cars on internal Swiss services are operated by the Cie Suisse des Wagons-Restaurants). Unlike the vehicles built by the Swiss Federal for the CSWR, these 10 new cars are to the standard UIC Type X 86½ft-long specification, which allows of two-and-one instead of two-and-two seating. Of lightweight construction and air-conditioned, each will weigh about 36½ tons.

working, besides increasing the freight traffic capacity of the trunk routes. Work is also proceeding on extension and mechanisation of existing yards at Aulnoye, Le Bourget, Le Mans, Clermont–Ferrand, Gevrey (Dijon) and Trappes (near Versailles) and is to begin shortly at Rheims, Vaires (E. Region Paris suburban area) and St. Pierre des Corps (Tours).

Gare du Nord improvements

The SNCF works programme now in hand includes, at Paris Nord, a new subway connection between the suburban platforms and the Metro.

BELGIUM

Jeumont-Charleroi-Liège electrification

One result of extending electrification at 3,000V from Charleroi to Jeumont (*see the March issue*) is an increase in the throughput of freight trains, not only in transit to and from France but also trains serving the many industrial plants between Namur, Charleroi and the French frontier, which traffic will be further facilitated by electrification to Liège and the German frontier. The SNCB has also accelerated and increased the frequency of the passenger service between Charleroi and Jeumont, which serves a densely populated area; most of the local services are worked by two-car m.us.

Electrification to Dinant?

The SNCB is reported to be giving further consideration to electrification from Namur to Dinant (17 miles) *en route* to the French frontier at Givet, 14 miles further, where there is an end-to-end junction with the SNCF line to Mézières–Charleville; the significance of this route for electrification purposes is the coal and mineral traffic between the Liège area and the steel plants in Lorraine. Presumably the SNCF would electrify the Givet–Charleville section. Also under consideration is electrification of the SNCB secondary main line from Dinant via Bertrix and Virton to Athus, on the Luxembourg frontier. This severely graded route conveys considerable mineral traffic, the volume of which, however, may not justify electrification and may well be within the capabilities of diesels. Moreover, electrification of the Namur–Arlon–Luxembourg trunk line has increased capacity, so that the bulk of the Luxembourg traffic can be routed that way.

Molten iron 170 miles by rail

The success of the transport of molten iron by conveyor wagon over relatively short distances (*see the December, 1964 issue*) has led the SNCB to experiment with longer transits in conjunction with the Luxembourg Railways and the SNCF. The same type of conveyor wagon is reported to have been used as for the Seraing to Chertal movement. On one trip 100 tons of molten metal were conveyed 154 miles from the ARBED plant at Esch-sur-Alzette (Luxembourg) to Chertal with a heat loss of some 225deg F, from 2,475 to 2,250deg. The route was via Athus, Arlon and Namur. The time between loading and discharge of the molten iron was 12hr. Later, a similar quantity of molten metal was transported 170 miles from Hagondage, near Thionville, in the SNCF Eastern Region, to Chertal via Longuyon, Virton, Bertrix, Jemelle, and Namur. The time spent in the conveyor wagon was a little longer but the heat loss was about the same. The SNCB and the other railways concerned with international mineral traffic are now studying the conveyance of molten metal over 200–250 miles.

SWEDEN

Powerful mixed-traffic silicon rectifier locomotive

ASEA is building 20 of a new type of 4,800 h.p. silicon rectifier locomotive for mixed traffic, including express passenger and heavy freight. This is the Class Rc for the Swedish State 15,000V electric lines and 40 more are likely to be ordered. The Rc, which is a Bo-Bo like other versions of the R class, has a maximum speed of 135 km.p.h. (84 m.p.h.). It is designed to meet three principal requirements: to haul the fast and heavy trains of the future, to increase operational safety, and to reduce maintenance costs. The result is stated to be a locomotive 50 per cent more powerful than older SJ main-line classes. The design is an improved version of the two silicon rectifier 4,500 h.p. locomotives Rb 1001–2, which were built by ASEA for the SJ in 1962 and proved successful in the international diesel locomotive tests in Roumania in the following year, and have a top speed of 75 m.p.h. It facilitates replacement of components on visits to shops. To allow of a possible future increase in tractive power within the limits of the dimensions and weight, and also to afford maximum adhesion, the traction motors are d.c. The thyristor rectifiers have the additional advantage of being maintenance-free as they have no moving parts. The mechanical portions have rubber components for practically all surfaces subjected to wear. The bogies are of ASEA design as developed by the SJ. Pneumatic disc brakes are to be fitted. While the SJ's earlier types of electric locomotive have their major overhaul after 150,000–250,000 miles' service, the new features incorporated in the Rc should make it possible to prolong this period to 1,500,000 miles, which is tantamount to only one major overhaul during its active service life. In addition, there would be a minor overhaul after 750,000 miles, also brake and wheel overhaul every 250,000 miles. Particular attention has been paid to service in severe climatic conditions, in temperatures ranging from below zero to 85 deg.F. For long periods the locomotives have to run on hard-frozen, unresilient track, which after a thaw tends to become uneven and afford bad riding in the spring. Both these conditions cause severe wear to rolling stock. The existing R class, all straight a.c. locomotives except the Rbs, was first placed in service on the SJ in 1955, when two units of the 3,600 h.p. Ra type were delivered. At that time they were the world's most powerful electric locomotives in terms of h.p. per ton and geared for a speed of 87 m.p.h. They were followed by the two Rb locomotives.

the Irish scene

Edited by L. Hyland

CIE

WINTER weather recently caused a considerable disruption of CIE services. On January 19 floods caused by torrential rain swelled the banks of the Shannon and flooded the Dublin–Sligo line near Drumsna. Trains that night managed to pass, but from the following morning two railheads were established. The Sligo-based railcar set worked the service to Carrick-on-Shannon and buses bridged the gap to Drumod, where trains from Dublin were turned. To make up the morning up ex-Drumod train, a set of empty railcars were provided from Dublin. The 18.15 down ran to Drumod, worked as the up night mail to Mullingar and returned as the down night mail to Drumod, where it stayed overnight and formed the connection off the 8.20 from Sligo as between Drumod and Dublin. This working continued to January 29, when the 15.00 Sligo–Dublin re-opened normal working through to Dublin. During the 10-day blockage through goods trains ran via Athlone, Claremorris and Tubbercurry, although this caused some difficulties in the recently introduced revised roster for Midland section goods trains. On the same date, January 20, high seas blocked the Dublin–Wexford line at the regular trouble spot—Ballygannon, between Greystones and Kilcool. Buses operated between Bray and Wicklow throughout the day.

A CIE package deal with Irish Steel Holdings Ltd. has put on rail a traffic formerly the province of coastal shipping. On and from February 17, instead of travelling by boat to Dublin, the steel is taken by lighter from Haulbowline—an island in Cork Harbour off Cobh—to Cork. At the quay sidings, opened to traffic in 1964, on Hargreave's Wharf it is transferred into rail wagons for Dublin, North Wall. The present annual tonnage is 30,000, but this is expected to increase greatly. It is understood that this traffic has been won by the railway on the grounds of speedier and more reliable transit.

UTA

The "Derry Road", as the 75½-mile line from Portadown to Londonderry is best known, is gone. The closure, originally scheduled for January 3, was postponed and a second attempt by Tyrone County Council to avert closure by legal means has come to naught. The last trains ran on Sunday, February 14 and were worked, as normally, by BUT railcar sets. Ironically, perhaps, the 10.00 down on the Sunday refused to leave Belfast. Many enthusiasts made the round trip from Belfast but it was the evening trains that attracted the attention of the public. The passenger total on the 18.30 Derry–Belfast fluctuated from 100 on departure to 340 at Omagh and 375 at Dungannon, but a good many were last-trip passengers travelling only one or two stations for sentimental reasons. Some returned on the last regular service train, the 20.05 Belfast–Derry, a BUT railcar set (123/573/124/594/134 and two vans), which left Portadown 14½min late having been delayed by the up train, itself 12min behind time. Time was lost inevitably en route as crowds turned out to pay their last respects at every station. Police, although in evidence, were not called upon to act as the crowds were not bent on destruction and indeed apart from the detonator salutes and the band on the platform at Strabane, a cord-pull approaching Derry was the only untoward incident. The railcar set returned from Derry shortly after the 29½min late arrival and brought passenger operation to a close, although a goods train collecting wagons was run on the following Wednesday, February 17.

traffic report

Edited by
G. M. Kichenside

One of the new blue-liveried 25kV a.c. electric multiple-units for the LMR's semi-fast services outside Rugby depot on March 7. *Photo by J. B. Groucott*

London Midland

THE availability of diesel locomotives between Rugby and Euston seems to have improved during February and steam substitutes for failed or non-available diesels were less in evidence. Notable by their absence for the first part of the month were "Britannia" Pacifics, which had been in almost daily use during January. None were reported in the London area until the appearance on several occasions of No. 70026 from the third week of the month. Unusual diesel workings included the appearance of three Brush Type 4 diesels—No. D1535 on February 6, an unidentified unit on the 24th and new No. D1820 on March 1—all light either up or down; No. D1767 (30A) was employed on Fords car trains between Dagenham and Rugby on March 10. The BR/Sulzer Type 2s on the Euston–Bletchley services now have another working on the Cambridge branch; the locomotive off the 16.21 Euston–Bletchley returns to London with a brick train from Stewartby. Trip workings on the Cambridge–Bletchley line are normally in the hands of BR/Sulzer Type 2s, but on February 3 EE Type 4 No. D305 was unusually employed on a Swanbourne–Luton coal working as far as Bedford. The four former Metropolitan electric locomotives Nos. 2, 7, 16 and 18, which had been stored at Mitre Bridge electric depot, were towed north from Willesden by a Class 5 4-6-0 on March 1 to Rugby electric depot. A correspondent points out that Nuneaton still has an allocation of steam locomotives contrary to the report in the March issue.

The next stage in the gradual run-down of the Great Central line was introduced on March 1 when many of the through freight services at present routed over the GC were diverted over other lines (*see page* 187). The 20.28 Marylebone–Preston and the 21.45 Oldham–Marylebone parcels trains now run via Calvert and Bletchley to and from the West Coast main line but the 20.25 SO Marylebone–York fitted freight spends even less of its journey on GC metals, for it runs no further than Neasden South Junction, where it reverses over the spur to the Midland Acton–Cricklewood line to gain the Midland main line to the north. The GC line changes will almost certainly entail further alterations in motive power diagramming for the Marylebone–Nottingham passenger services. Most of the passenger turns at the end of February were in the hands of Stanier Class 5 4-6-0s, but the variety of power continues on freight and parcels trains. Nevertheless the 17.15 Nottingham–Marylebone semi-fast produced Class B1 4-6-0 No. 61299 (40E) on January 16, Class V2 2-6-2 No. 60831 (50A) three days later and "Jubilee" class 4-6-0 No. 45593 (9H) on January 29. The locomotive of this train is serviced at Willesden and in the latter case must have resulted in the illicit appearance of a yellow-banded engine there, although it had not strictly infringed the ban on its use south of Crewe on the Western Lines. Although the use of diesel power on GC services is inconsistent the former LMS Co-Co diesel No. 10001 has become a fairly regular performer on GC freights between Neasden and Woodford, its most frequent appearances being on the 15.15 from Neasden, returning on the 18.52 from Woodford. A Hymek Type 3 diesel worked into Aylesbury on February 17 with an officers inspection saloon. Recent arrivals in Sheffield for breaking up have included three Stanier "Coronation" Pacifics, Nos. 46238/45/51.

The Midland Lines' London Division is the first on the LMR to have achieved full abolition of steam power and there are now no steam locomotives allocated to the southern end of the Midland Lines, and in practice steam traction is only rarely employed south of Wellingborough. The Midland Lines' entire diesel locomotive allocation has been reorganised and is now based on diesel maintenance depot allocations, with a pool of locomotives under the control of the Line office at Derby. Full details are shown in Motive Power Report on page 240.

Out and home diagrams introduced at Toton depot have removed the workings by Toton locomotives and crews through to the Western Lines with freights to and from Willesden. The Toton locomotives now travel no further than Northampton, where the through freights are taken over by Willesden-based locomotives.

Following the opening of the connection between the former GN and Midland lines on the Nottingham side of Netherfield and Colwick station, Colwick Class O4 and WD 2-8-0s are being employed on transfer freights between Colwick yard and Beeston sidings. During February a Canklow B1 4-6-0 had a fairly regular turn on the 17.50 Sheffield Midland–Nottingham Midland train, although on about two days in each week the train reverted to diesel haulage.

Most of the excursions in the West Midlands for the fourth round FA cup ties on January 30 were diesel powered. The 7.20 Whitchurch (Salop)–Paddington had Brush Type 4 No. D1689, and D1692 took over a Mirfield–Swansea excursion from "Jubilee" Class 4-6-0 No. 45565 at Crewe. Later in the day, two Tinsley units, Nos. D1768/75, arrived at Wolverhampton High Level with excursions from Rotherham and Swinton respectively, having travelled via Derby, Burton and Walsall. The eight excursions from South Wales to Edinburgh for the Scotland v. Wales Rugby international on February 6 were all booked for Brush Type 4 haulage to and from Crewe Gresty Lane. The five trains which returned on February 7 were all noted thus powered, the locomotives having run light from Cardiff to Crewe to take over the return excursions. The fifth round of the FA Cup on February 20 produced two excursions in the West Midlands. The 8.50 Wellington Salop–Leeds City was headed by Stanier Class 5 4-6-0 No. 45060 (5D) to Crewe Gresty Lane, where it gave place to EE Type 4 No. D298 for the remainder of the run via Stockport and Stalybridge. The second train, the 9.05 Shrewsbury–Leeds, was in the charge of "Britannia" Pacific No. 70053 and travelled via Chester, Earlestown and Manchester Exchange.

Several "Western" Type 4 diesels have deputised for non-available Brush Type 4s on Paddington–Shrewsbury–Paddington out-and-home turns during February. The most usual turn for the "Western" units seemed to be the 9.10 Paddington–Birkenhead as far as Shrewsbury and the 11.40 Birkenhead return.

From February 1 the LMR introduced diesel multiple-units on the Manchester Exchange–Chester General and North Wales service, with the exception of the 16.25 Holyhead–Manchester and the balancing 22.00 boat train working. In spite of the protests which followed the withdrawal last year of the locomotive-hauled stock on the Southport and Blackpool "club" trains to Manchester, the LMR has decided that a four-car d.m.u. will suffice for the 7.40 Llandudno–Manchester and the 16.30 return "club" trains. Most surprising is the use of an ordinary Derby lightweight set on the 12.00 Manchester–Holyhead—a 124-mile, 4½hr journey—which replaces an eight-coach steam train that included a miniature buffet

and additional parcels vans as well. The replacement units comprise mainly Birmingham RCW and Metro-Cammell two-car sets displaced from axed services elsewhere in the Region, some of which, claims our correspondent, are well worn in sound and appearance.

Several Stanier Class 5 2-6-0s have been allocated to the Lancaster and Carnforth areas and have been employed on Leeds–Morecambe passenger trains and special Carnforth–Castleton rail-carrying trains. Further incursions into surviving steam turns in South East Lancashire occurred in February when BR/Sulzer Type 4s took over a number of short-haul freights between Brewery and Castleton or Rochdale, presumably on fill-in duties. On January 13 D170 powered the Red Bank–York ECS. This train produced "Britannia" Pacific No. 70036 on February 18, but the engine travelled only as far as Rochdale, for it was discovered that Newton Heath had no Type 4 diesel available to power the afternoon Manchester–Glasgow train; No. 70036 was hurriedly commandeered and returned light.

The former Mersey Railway 0-6-4T *Cecil Raikes*, stored in recent years at Derby Works, left Derby on February 17 bound for Kirkby, where it will be restored for preservation in the transport section of Liverpool Museum. *Cecil Raikes*, however, ran hot on the journey and eventually seized up altogether at Halewood; fitters had to be summoned to carry out temporary repairs to allow the engine to complete its journey.

(For LMR information we are indebted to Messrs. P. Heaps, J. I. Lloyd, W. D. King, N. Hayllar, D. R. Thornhill, B. J. Billingham, P. Donovan, J. Jarvis, B. R. Tunnard, I. G. Pickering, D. T. J. Rollason, E. N. Bellass, R. S. Greenwood, R. D. Stephen, M. Collard, M. Clark, T. A. Fletcher, H. Gillot, M. Wood, S. Kinsey, D. J. Compton, S. A. Leyland, J. Bolt, A. Rose, J. Lanham and R. I. Buckby.)

Eastern and North Eastern

The Brush Type 4s on Liverpool Street–Ipswich–Norwich passenger services have brought an improvement in timekeeping and their extra power compared with the Type 3s is proving of value in rapid acceleration from speed restrictions imposed because of engineering work. One or two of the EE Type 4s displaced from Colchester line passenger duties have been employed on Liverpool Street–Cambridge passenger services, but about 90 per cent of the Cambridge line passenger trains are now diagrammed for EE Type 3 haulage. The remaining EE Type 4s are now on Cambridge line freight services, particularly the heavier trains which formerly required two Type 2s. One or two Brush Type 4s have also been employed on Cambridge line freights, possibly as part of cyclic diagrams between London and Norwich by both routes.

GE area suburban and outer suburban electric multiple-units continue to be mixed, and LTS line units, which in normal running do not come into contact with other GE services although they do so on maintenance visits to Ilford depot, have been employed on Southend Victoria and Hertford/Bishops Stortford services. In return, Hertford and Southend Victoria line units have been used on LTS services. Sets have even been intermixed between Enfield/Chingford lines and the outer suburban services, despite the normal second class-only nature of the former units. Meanwhile, at least three LMR Western Lines four car a.c. multiple-units are still on loan to the GE lines and are conspicuous by their lined green livery by comparison with the unlined style of the native GE sets. One of the original Liverpool Street–Shenfield three-car open sets is reported to have been repainted in Rail-blue livery.

Among the locomotives stored with those at Stratford awaiting preservation are a National Coal Board locomotive, No. 67, a vertical boilered 0-4-0 locomotive whose origin was not reported, and two Barclay diesel shunters Nos. D2954/6, although it seems unlikely that the latter two are candidates for preservation.

On February 8, Brush Type 4 diesels Nos. D1798/9 were noted at Hitchin heading north bearing a Scunthorpe destination headcode with 35 bogie bolsters carrying electrification masts and gantries. Ashwell goods yard near Royston on the Hitchin–Cambridge line, however, is now being used as a store for electrification materials including steelwork, insulators, conductor and catenary wire and mast attachments. This may possibly be intended for the electrification of the Lea Valley line between Stratford and Cheshunt.

From the beginning of the year the Tyne Dock–Consett iron ore workings have gradually been taken over by BR/Sulzer Type 2 diesels, working in pairs. The Type 2s allocated to these duties have been provided with additional air compressors for the operation of the air-worked doors on the bogie hopper wagons. An EE Type 4 diesel has also been employed on banking duties between Pelton and Annfield Plain instead of the standard Class 9 2-10-0s previously used. Tyne Dock depot is expected to be dieselised shortly and it is believed that its remaining steam allocation will be sent to Blaydon shed, which may be re-opened temporarily until steam power is abolished.

The preserved Class A3 Pacific No. 4472 *Flying Scotsman* was given general overhaul at Darlington works during the winter as part of which it received a replacement boiler from another withdrawn member of the class. After the completion of the work the engine will be displayed at a Darlington works open day on April 3. On Saturday, April 10, No. 4472 will be used on a special run for invited guests from Darlington to Peterborough with a train composed of "Tees-Tyne Pullman" stock. The train is scheduled to leave Darlington at 10.20 and arrive at Peterborough at 13.10. On the return journey it is routed via March, Spalding and Sleaford then via Barkston North Junction to rejoin the East Coast main line back to Darlington. It is booked to leave Peterborough at 13.25, call at Sleaford from 14.44 to 14.52 and arrive at Darlington at approximately 17.35.

(For E and NER information we are indebted to Messrs. B. P. Mooney, R. J. Vincent, D. C. Wilkinson, R. Strutt, M. I. Clementson, R. J. I. Corden and V. Wake.)

Western

Four Swindon-built Type 1 diesel-hydraulic 0-6-0s are now allocated to the London area, but by the end of February three had already been returned to Swindon works for attention, two with broken oil pipes within the transmission and one for a damaged gearbox. Old Oak Common was thus left at one time with only two Type 1 locomotives for three duties and a Hymek Type 3 was appropriated to cover the third turn. Four Brush Type 4 diesels are to be named, *North Star*, *I. K. Brunel*, *G. J. Churchward*, and *Sir Daniel Gooch*, respectively. The first received their nameplates in ceremonies on March 20 and the latter two are to be unveiled on May 8.

Steam power continues to make frequent appearances in London area freight and parcels trains, largely as a result of the concentration of main-line diesel locomotives on passenger diagrams to cover failures. The evening Hayes–West Midlands parcels train, normally a Brush Type 4 diagram, reverted to steam haulage during February, and was generally powered by a "Hall" or "Grange" class 4-6-0. Other steam-hauled services are generally in the hands of Southall's remaining 61XX 2-6-2Ts, and WR 4-6-0s and 2-8-0s from a variety of depots. Nevertheless, former LMS types, particularly Class 5 4-6-0s and Stanier 2-8-0s, and generally from the West Midlands, have been reported on a number of occasions with coal and general freight. The most notable visitor was "Jubilee" 4-6-0 No. 45660 (55A), which was at Old Oak Common on February 22; it moved to Southall during the following day and worked out early on February 24 with the 00.50 Southall–Crewe freight. Various LM-based standard 2-10-0s, including Crosti-boilered No. 92028, have also been reported at Southall, while at least two "Britannia" Pacifics were noted at Paddington at the end of February—No. 70051 (5A) with a Wolverhampton–Paddington excursion on February 27 and No. 70053 (6J), which was reported heading west through Hayes with a special from Paddington, on March 1. Old Oak Common shed is to be closed to steam power at the end of March.

The Oxford area also continues to see a number of steam-hauled trains, mostly freights to and from the London area but also on some inter-Regional passenger trains to and from the Southern Region. The "Pines Express' is still diagrammed for "Merchant Navy" haulage between Bournemouth and Oxford and, although a Brush Type 4 is booked between Crewe and Oxford, the train was "Britannia"-hauled over this part of the journey on a number of occasions in February. The York–Bournemouth train is also booked for steam haulage, generally by a "Hall" or "Grange" 4-6-0 which works between Banbury and Basingstoke. Another regular steam turn is an afternoon local Didcot–Oxford parcels which is usually in the hands of a WR 4-6-0.

Following the closure of Reading WR steam shed, diagrams of locomotives working through to the SR have been altered and a number of new diesel duties take WR locomotives well into SR territory. A Brush Type 4 is now booked to work the 12.15 Washwood Heath–Eastleigh freight and returns later the same day with the 20.10 Southampton–Market Drayton freight.

In addition to the troubles besetting WR-based diesels, failures also occurred on the SR Birmingham RCW Type 3s employed on the Fawley–Bromford Bridge oil train on occasions at the beginning of February. On January 30 the southbound train appeared at Oxford behind Willesden EE Type 4 No. D306, which took the train as far as Didcot, and on February 4 the southbound working was noted at Oxford behind ex-works standard Class 9 2-10-0 No. 92047.

"Western" Type 4 diesels took over the majority of Swansea–Paddington services at the beginning of February and replaced Brush Type 4s temporarily transferred away to cover failures elsewhere. The delivery of new Brush Type 4s to Old Oak Common and Plymouth, however, has partially offset "Western" Type 4 redeployment on other services and there has been no further large-scale reversion to steam power in South Wales on diesel diagrams other than those already in operation earlier in the year. Nevertheless, steam traction continues to be employed regularly on certain South Wales main-line freights, particularly the Briton Ferry–Birmingham steel billets train, which is generally worked by a "Hall" 4-6-0, Stanier 2-8-0 or Standard Class 9 2-10-0, and irregularly on other services. Standard 2-10-0s have been reported on Milford Haven oil train workings and their associated westbound empties and 66XX 0-6-2Ts from Neath and West Wales continue to be employed on freights into Margam yard from West Wales. On January 22 diesel-hydraulic Type 1 No. D9512 of Margam broke new ground for the class when it was employed on a limestone train from Cornelly Quarries to Tondu and back. "Britannia" Pacific No. 70047 (6J) was at Cardiff East Dock on

February 17, but its working has not been reported.

A correspondent commenting on the working east of the Severn Tunnel by South Wales EE Type 3 diesels observes that a locomotive of this class from Barry manned by a Severn Tunnel Junction crew is diagrammed to work throughout to Old Oak Common with the 15.15 Barry–Old Oak Common banana train, an "if required" working which at present has been running about three days a week. Latest arrivals at South Wales scrapyards have included "Royal Scot" 4-6-0 No. 46148, "Jubilee" 4-6-0 No. 45577 and "West Country" Pacific No. 34099. All were delivered to Swansea East Dock during the middle of February.

Presumably as the result of a reshuffle of diesel motive power, including the transfer to other areas of multiple-units, the Seaton–Seaton Junction and Axminster–Lyme Regis branch services reverted to steam operation during February. The Seaton branch is worked by a 14XX 0-4-2T and auto-trailer, for which duty the last two surviving 0-4-2Ts Nos. 1442/50 have been transferred to Exmouth Junction, while the Lyme Regis branch is covered by an Ivatt Class 2 2-6-2T and a brake composite. The 2-6-2T and its coach return to Exeter each night as a passenger train on the main line, but the Seaton branch engine works light to and from Exmouth Junction. An NBL Type 2 diesel-hydraulic locomotive was employed, probably for the first time, on the Sidmouth and Tipton St. Johns–Exmouth branches on January 30; the locomotive worked the 16.30 Sidmouth Junction–Sidmouth passenger duty and continued on the normal multiple-unit diagram including the 18.43 Sidmouth–Exmouth. The Yeovil Junction–Yeovil Town branch, which had been worked by a railbus from January 4, has reverted to steam power on a number of occasions since then, usually with a 64XX 0-6-0PT and a push-pull coach.

The Exeter–Exmouth diesel multiple-units have been formed into four-car sets by the addition of an extra trailer; from January 4 the last steam workings on the Exmouth branch, the 8.20 Exmouth–Exeter and 17.45 return, were taken over by diesel multiple-units. A four-car Inter-City diesel multiple-unit of the type normally employed between Cardiff and Plymouth found its way on to the former SR main line on January 29 when it worked the 7.50 Plymouth–Salisbury and 13.10 return.

Meldon Quarry, situated just west of Okehampton on the former SR Exeter–Plymouth main line, which has supplied all the SR's track ballast for many years, will cease to do so at the end of the year. This will bring to an end the trains of ballast hoppers which have been a familiar sight between Meldon and other parts of the Southern Region.

(For WR information we are indebted to Messrs. B. W. Marshall, J. A. Ainsworth, M. P. Higginson, P. N. Herbert, D. J. Sutcliffe, R. W. Somer, R. Shepperson, P. E. Polton, R. Davies, G. H. Davies, B. Hay, R. Woods, B. C. Ayres, C. M. Napper, G. L. Hooper, N. Medley, D. J. Compton, J. R. Freshney, D. M. Smith, V. Bunting, M. D. Ranscombe and L. A. Hopkins.)

Southern

A blizzard early on March 4 brought chaos to all divisions of the SR—despite considerable publicity handouts last autumn proclaiming the introduction of more point heaters and that BR were ready for a hard winter. Steam and diesel locomotives were employed to propel or haul icebound electric multiple-units on a number of lines until conductor rails were cleared sufficiently of snow and ice to allow electric trains to run under their own power. The up "Night Ferry" arrived at Victoria about 1hr late behind electric locomotive No. E5021, but the South Eastern Division authorities took no chances with the "Golden Arrow" which was powered by Type 3 diesel No. D6554.

Like last year's January 13 blizzard, which practically paralysed South Coast electric services, drifting snow blocked carriage depot exits and unheated points, although BR had ample warning of the snowfall to employ more primitive methods to combat snow such as the use of salt.

After the initial teething troubles, the Reading–Redhill–Tonbridge diesel service settled down by the end of January to a fairly reliable performance. Although reports of diesel multiple-unit failures on the Oxted line during February were notable by their absence, from March 1 Hampshire units took over about 50 per cent of Oxted line duties, and failures led to the use of one of the hybrid Reading–Redhill diesel units on a Victoria–Oxted line working on at least one occasion during January. A Hampshire three-car diesel multiple-unit is reported to have been fitted with B4-type bogies.

Following the dieselisation of the Tonbridge–Redhill service Tonbridge shed has now closed and the few steam locomotives in this area are now dealt with at Tunbridge Wells West. The surviving steam duties on Tunbridge Wells–Eastbourne or Lewes services, both rostered and as diesel substitutes, are normally filled by standard Class 4 2-6-4Ts, although a few isolated Class N 2-6-0s have been reported.

The Horsham–Brighton diesel service is still suffering from failures and a shortage of both diesel multiple-units and locomotives which have been appropriated to cover Oxted line and other duties. Steam workings have been reported on a number of days in January and February with Class N 2-6-0s, Q1 0-6-0s and standard Class 4 2-6-4Ts, but on at least one occasion a light Pacific was employed.

On February 26 there were no fewer than 20 ex-LMS locomotives at Eastleigh, either withdrawn or awaiting attention at the works. The SR continues to employ ex-works LM locomotives on domestic services, which undoubtedly was the reason behind the use of Ivatt Class 4 2-6-0 No. 43006 (12D) on a freight from the former MSWJ line at Andover on February 6.

(For SR information we are indebted to Messrs. P. Davies, C. J. Hill, N. Remnant, W. Sharp, S. M. Hardy, "30667" J. Critchley, R. K. W. Godfrey and R. McQuade.)

Scottish

During February there was a shortage of Class A4 Pacifics at Ferryhill; of the nine locomotives allocated, two, Nos. 60019/34 were at Darlington for overhaul, No. 60026 was stopped for examination, and No. 60004 had been stopped for repairs to its centre driving wheels. As a result, other types deputised and St. Margarets locomotives were employed on the 22.30 Craiginches–Millerhill freight. In addition to V2s, St. Margarets turned out two of its remaining A3 Pacifics and its A4, No. 60024. The Paxman-engined NBL Type 2 diesel, No. D6123, continues to be employed on the 8.25 Glasgow–Aberdeen and the 17.15 return although it failed on February 13 and was replaced by an A4; on February 18 No. D6123 was again not available for the 17.15 train as it had been sent to Inverurie for attention to its bogies.

Brush Type 4 diesels are now extending their range of operation in Scotland; besides the Perth–Glasgow–Aberdeen–Perth working off the down "Royal Highlander" another Crewe-based locomotive of this type powers the 10.00 Glasgow–Aberdeen (not the 22.15 mentioned in the February issue). Another Brush Type 4, usually from Gateshead or Finsbury Park depots, heads the 14.43 Glasgow–Edinburgh parcels; a member of the class was also unusually employed on the "North Briton" on February 16.

"Britannia" Pacifics have made more frequent appearances in Scotland during February; No. 70039 worked the 16.07 Perth parcels from Aberdeen on January 29, and on February 9 No. 70018 had charge of the Perth–Broad Street fish. On the previous day, No. 70002 was employed on the 23.10 Euston–Glasgow sleeper between Carlisle and Glasgow via Kilmarnock following an earlier diesel failure at Warrington. After standing at Warrington for about 1hr 10min awaiting rescue the train eventually arrived at Glasgow Central 3hr 22min late.

(For Scottish Region information we are indebted to Messrs. R. A. Errington, G. Mackenzie, D. W. Smith, A. G. Murdoch, C. Branford, N. A. H. Tindall and F. Munro.)

Workshops

Under construction at Crewe during February were Brush Type 4 diesels Nos. D1658–81 and D1842–4. The latest example to be delivered to Derby from the Brush Works at Loughborough had reached No. D1818, although isolated later locomotives may have been delivered out of order. The BR/Sulzer Type 2s under construction at Derby had reached No. D7527 by the middle of February.

(For Workshops information we are indebted to Messrs. D. Dean, J. Bell, D. R. Stopher, W. J. Macmillan and G. R. Hounsell.)

motive power report

THIS list is correct to the following dates: L.M.R., January 30; ER, February 6; NER, January 30; ScR, January 30; SR, February 15; WR, February 21.

MOTIVE POWER DEPOT CHANGES

On and from January 16 the LMR Midland Division Main Line Diesel locomotives were re-allocated and recoded as follows: Line Power Controller, Derby-ML; Leicester Division-D15; London (Midland) Division-D14; Nottingham Division-D16. For detailed allocations, see LMR List W/E January 16.

The following Depots closed, January 18: Oswestry (6E); Bala and Penmaenpool (subs. of 6C).

NEW LOCOMOTIVES

2,750 h.p. Diesel-electric Co-Co: D1652/3/4/5-86A; D1656/7/8/9-87E; D1792/8/9, D1800/1/2/3/5/6-41A; D1807/8/9-D16; **1,750 h.p. Diesel-electric Co-Co:** D6959/60/1/2/3/4/5-41A; **1,250 h.p. Diesel-electric Bo-Bo:** D7519/21/2/3/4/5/6/7-D16; **900 h.p. Diesel-electric Bo-Bo:** D8612/3-41A; **650 h.p. Diesel-hydraulic 0-6-0:** D9527/8-82A; D9529/30/1-86A.

LOCOMOTIVES REALLOCATED

London Midland Region: W/E January 2: 41222/85-12B; 42676-9K; 42947/50/8/67/72/4/5/8/81/2-9G; 44160-12D; 44218-16G; 44310/89-10G; 45530-12A; 45593, 45600-9D; 46152-12A; 48039-10D; 48278-8F; D223/8-9A.

W/E January 9: 42494-10C; 42660-10D; 45056, 45113, 45349/92, 45426/54-1H; 48012/35/6, 48171, 48252, 48347, 48416, 48658-5B; 48016, 48120-2B; 48018, 48147, 48354/69-5D;

48062-10D; 48173, 48287, 48411-6B; 48261/75-8F; 48322-9G; 48738/55-2B; 70004/10/2/4/20/1/31-5A; 73004/39/40/8-5E; 90080, 90367-10F; 92076-12A; 92083-16B; D211/7/30/3/92/7, D329-1A; D215/31/4/5/87/90/8, D314/43/81-1F; D288/9, D330-5A; D3836/7-8C; D5000/1/4/7/9/20/1/3-1B; D5012-1F; D5035/74/81-1A; D5144/5-1F; D5289-15A.

W/E January 16: 3782-2B; 6129-2C; 6917-2D; 44762/3/4, 44814, 45027-1G; 44837/63/70, 44909/15/38-1E; 44859, 45052/8-2E; 45182-12C; 45374-5C; 47667-12A; 73000/10/1/3/4/33/8/67/71, 73157/60-2B; 75020/3/54, 76023/89-5D; 76095-2J; 90364-10F.

On and from January 16 all Midland Division Main Line Diesel locomotives ceased to be allocated to specific depots and were reallocated to Divisions or under the control of the Line Power Controller at Derby. The revised allocation as at January 16 and the revised code numbers are as follows: Line Power Controller, Derby-ML; London (Midland) Division-D14; Leicester Division-D15; Nottingham Division-D16.

At ML: D12/43-5/7-56/8-61/3-7/9-74/6/8-80/2/3/5-91/3/5-9; D104-7/9/11-8/20-5/7-36/8-42/64; D5184-6/91/2/4/6/8/9, D5200/1/3-12/23-5/7-31/5/43-5/7/8/50/1/4; D5379-82/7; D7568/9/72-6/9/80/4/8-93/5/7.

At D14: D5084-6/8; D5213-22/42/6/81/4-8/90-3; D5383-5/9/96/8/9, D5400-3/7-10/5; D7515-7.

At D15: D57, D119/57/9-62; D5249/89; D5386/8/90-5/7, D5404-6/11-4.

At D16: D1-11/3/46/62/8/75/7/81/4/92/4, D100-3/8/10/26/37/43-56/8/63/5; D1616-30; D5187-90/3/5, D5202/37-41/52/3/5-73/80/2/3/94-8; D7500-14/8-22/71/7/8/81/3/5/94/6.

W/E January 23: 1638, 3850/5-6C; 7802/3/19/22/7/8-6D; 43073-1E; 44358-12D; 46510/1/2-6D; 46513/4-9D; 46515/6/8-8C; 46520-5E; 47406-8A; 48107-15E; 48122, 48345-6D; 48617/96-15E; 48754-1A; 48757-1G; 73025/90-2B; 76085/99-5D; 80131/2-6H; 84000/4-6C; 92020/84/9, 92111/27-8H; D3034-2H; D5296-E.R.; 12049-1A.

W/E January 30: 42121-8H; 42209-5D; 42460-10C; 42478-5D; 44930/5-8F; 45567/95-5A; 48012, 48171-5D; 48353-2C; 76040-2J; 90632, 90724-8L; D139-D16; D3106-2B; D5239/45/66, D7508/18-2E.

Eastern Region: W/E January 16: 43080-41E; 61145/90-41D; 61225-36A; 61232/48-40E; 61392-41D; 62014/5/67-36C; 63813/78-41H; 90084, 90190, 90225, 90383, 90496-41E; 90121, 90227/58/66, 90301-41H; 92042, 92189/91-41J; 92183/6-36A; D4187/8/90-41A.

W/E January 23: D5296-40E.

W/E January 30: D3684-30F; D4189-41A.

W/E February 6: Nil.

North Eastern Region: 4 weeks ending January 30: 42055/73, 42177-56F; 42108/65, 42204-56A; 43070, 43132/7, 60117/48-56B; 90723-56F; D2312/34-52A.

Scottish Region: 5 weeks ending January 30: 45115, 45471-67E; 61221-62B; D2422/4-60A; D2774-65A; D3558-62B.

Southern Region: Period ending February 15: Nil.

Western Region: Period ending February 7: 3699-86E; 4268-86B; 9446/64/75-88B; 44422, 73001-85B; 92243/8-88A; D1636/7/8/9/40/2-87E; D3955-81A.

Period ending February 21: 1442/50-83D; 3796, 6978-86E; 7923-88A; 8415, 9680-82E; 73030-82F; 75022-82E; 80035-83E; D0280, D1611/2/3/99, D1728-82A; D2144/6-85A; D3511-86A.

LOCOMOTIVES WITHDRAWN

1663/8, 2231, 3699, 3700, 3807, 4172, 4297, 4993, 5936/90, 6649, 6860, 6904/35/55, 7244, 7818, 7910, 9624, 9796, 35024, 41215, 41308, 42400/59, 42634, 42722/91/9, 43032/59/65/85/93, 43127/45/55/6/7/60, 43850/87, 43950/75, 44049/65, 44121/7, 44214, 44358, 44402/86, 44548, 44739, 45102/78, 45306/27, 45567/86/95/7, 45642/52/67, 45704, 46420/3/72, 47468/85, 47616/64, 48001/6/7, 48387, 60126/8/40/57, 61120/53/79, 61338, 62020/33/40/51/66/70, 63351, 63703, 64585, 65927, 73077, 80042, 90042, 90119, 90221/82, 90327, 90602.

AMENDMENT

December 1964 issue: LM Region W/E September 19: 48005/6-15A should read 84005/6-15A (48005/6 remain at 1G and 16E respectively).

SOUTHERN ELECTRIC AND DIESEL-ELECTRIC UNITS (period ending January 22)

Withdrawn: 3070. **Reformed:** 2-EPB; 5710.

new books

Books reviewed in this feature and published in the United Kingdom are available from Ian Allan Ltd., Mail Order Department, Terminal House, Shepperton, Middlesex, at the price shown, plus return postage.

DECLINE OF STEAM. By Colin T. Gifford. *Ian Allan.* **63s.**

The local manager struggling to keep his costs down to his budget forecast, the signalman wearily finishing a lonely night shift, the fitter grappling with undiagnosed trouble and grime in the innards of a locomotive—all these and many more can be forgiven for seeing neither art nor beauty in a life on the railway. They can be excused, too, if they regard the three-quarter view panorama of clean locomotives on sunny days' work that illustrates most railway literature as a chocolate-box-top glamorisation of the real business of running the system at all hours and in all weathers. In this they are absolutely right—in fact, a great deal of this kind of photography leaves one wondering whether a railway is run for any other purpose but to move machinery from A to B.

But that there is abundant scope for art in the railway as a whole, taken just as it is and without selective glamorisation, is amply demonstrated in this brilliant one-man show of some 300 photographs. The theme is the steam locomotive, but it is not one of those tedious parades of orthodox train poses and familiar locations. This is the locomotive as its fitter sees it in a dingy depot, its driver as he comes on duty on dank, cold December mornings, or the commuter as he is vaguely aware of it through hanging steam at the terminal barrier. There are shots of trains in the open country or criss-crossing an industrial area. But for the most part these too are as one sometimes remembers them, suddenly and perhaps distantly catalysing beauty with their steam and movement out of an otherwise unmemorable setting, not artificially halted with sun-decked smokebox door slap in the foreground of the resultant negative by the fastest of camera shutters. This is the first display of artistry, as opposed to sheer technical ability, in railway photography to be published in this country, though not abroad. One hopes it will be an inspiration to the rest of the craft. My only criticism would be that some of Colin Gifford's lighting is unnecessarily over-dramatised. Production, on large album-shaped art pages of quality, is good, but a little of some of the prints' punch seems to have been lost in the process of transference from folio to book pages. **M.N.**

THE GOLDEN VALLEY RAILWAY. By Charles Loch Mowat. *University of Wales Press.* **15s.**

Something like 30 years ago this reviewer and his wife travelled by an afternoon train from Hay as far as Dorstone on the Golden Valley line, then operated by the GWR. We were accompanied by one other passenger, a schoolboy homeward bound, and at our destination discovered the train was widely known as "Robin's train" because he was usually alone in his glory. So the Golden Valley epitomised the story of many Victorian branches that failed, even before the present intensity of motor traffic, to attract real business. Mr. Mowat first travelled on the line a year or two before me, sensed its interesting story and has now set it on record as a labour of love. We get everything, from financial turmoil to the company's own locomotives and rolling stock, with eventual Great Western equipment, from economics and the poor returns, rows on the board and proposals for extensions, to tickets and traffic working. The photographic illustrations are good and there is a map which is all but excellent and fails only in the omission of some symbols from the key. *The Golden Valley Railway* should be read by all nostalgic backward-looking supporters of rural branch railways as an awful warning. **C.F.K.**

TALYLLYN CENTURY. Edited by L. T. C. Rolt. *David & Charles.* **21s.**

That "no voluntary organisation in the world has ever underwritten so great a feat of material reconstruction and administration entirely from its own resources", as L. T. C. Rolt claims of the Talyllyn Railway preservationists in his introduction, may be the pardonable exaggeration of an enthusiast. But the Talyllyn venture, nevertheless, is assured of a unique place in British history, as the first attempt to revive a moribund public transport system with voluntary effort. Not least among its achievements, in my experience, is that of having retained the cheerful camaraderie with which it was launched, and of having avoided—or perhaps kept out of sight under astute control?—the clashes of factions and prima donnas that too often discomfort voluntary enterprises. The Talyllyn is also blessed with able chroniclers among its leading officers. Under the guidance of L. T. C. Rolt, six of them have compiled this symposium on all aspects of the railway, past and present, to mark its centenary. The history of the railway both under its original ownership and in the early years of its revival has been told before, but this new book adds fresh detail and incident, as well as bringing the development right up to date. **A.J.**

MUNICH TRANSPORT EXHIBITION

For individual visitors to the International Exhibition of Transport to be held at Munich from June 25 to October 3, Ian Allan's Travel Bureau offer a special inclusive travel plan. Basic fares range from £35 10s to £46 10s. This fare covers: second-class travel London to Munich and back, outward via Ostend, Cologne, Stuttgart and Ulm, returning via Stuttgart, Frankfurt, Cologne and Ostend; choice of either bed and breakfast or half-board (bed, breakfast and evening meal) at hotel in Munich for six nights; and a zonal season ticket based on Munich, which offers unlimited travel within the zone for the full duration of the stay (this permits travel between Munich and Salzburg, Berchtesgaden, Kufstein, and on a host of minor and branch lines to the south and east of Munich). First-class travel can be provided at a supplementary rate. Departure can be made on any day, but no break of journey can be made between London and Munich. For full details, write to Ian Allan Travel Consultancy service, Terminal House, Shepperton, Middlesex.

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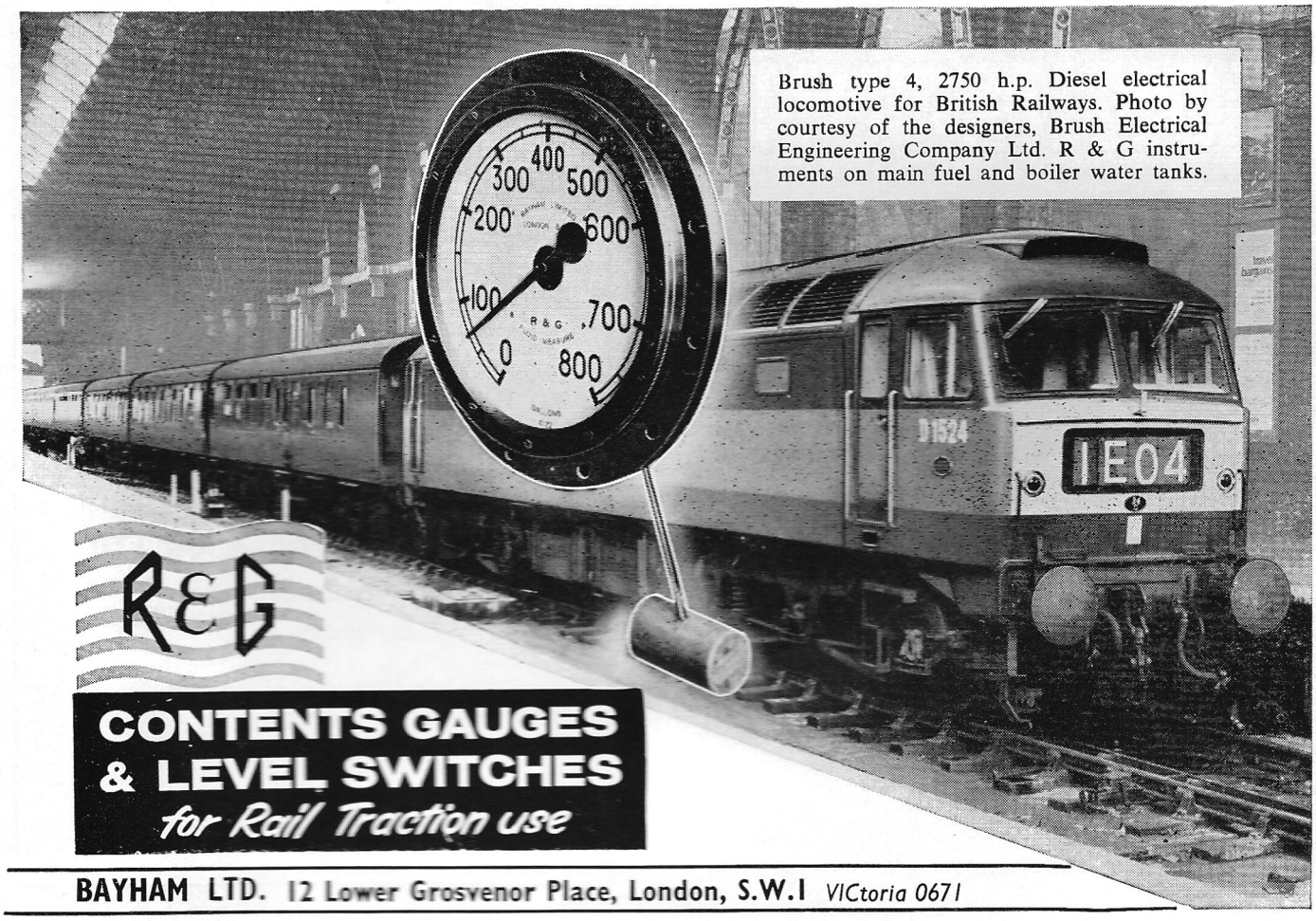

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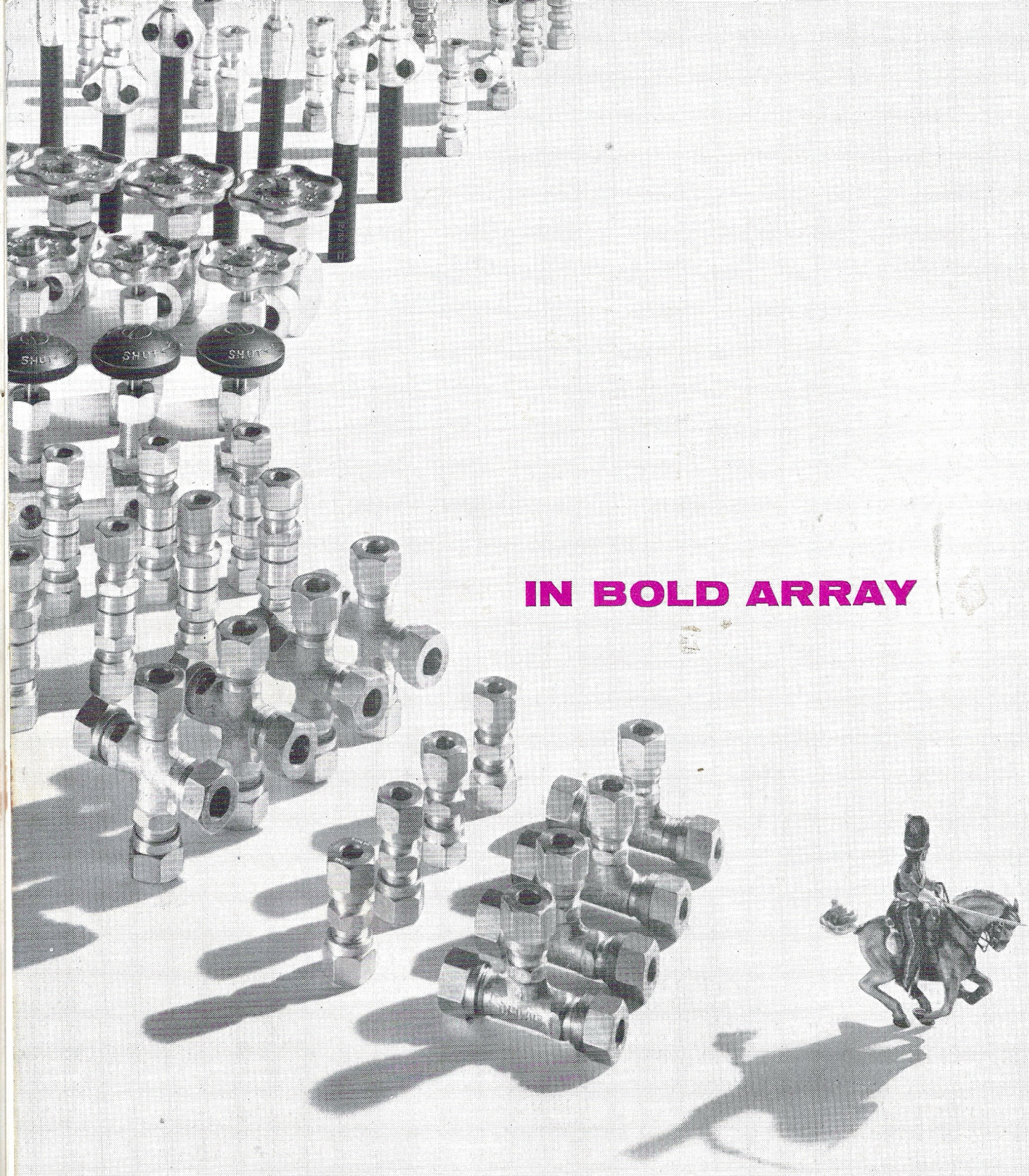
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